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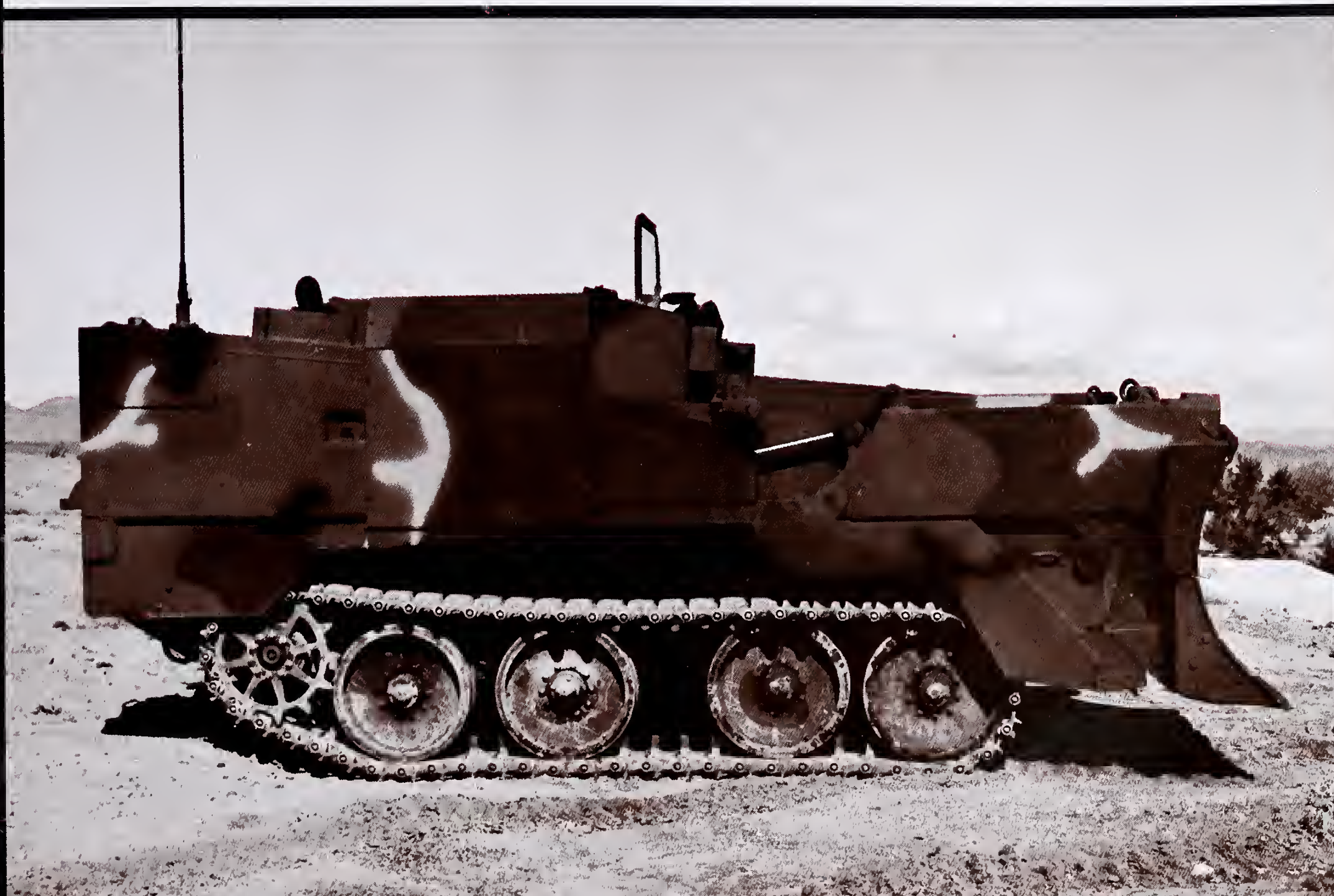

THE M-9 ACE CONTINUOUS EVALUATION

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ABOUT THE COVER

The M9 Armored Combat Earthmover shown on the front cover is the subject of an article on some of the lessons learned in applying the concept of continuous evaluation. The back cover photograph of a Soviet BMD-1 Amphibious (airborne) Infantry Combat Vehicle is related to a photo center spread of Soviet military equipment.

FEATURES

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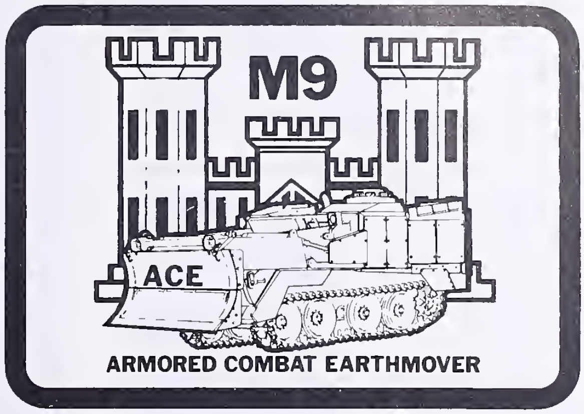
The Continuous Evaluation Paradox



By LTC Joseph G. Papapietro

Elements of the 15th Engineer Battalion were already performing "before-operations" checks and services on the M9s as the sun rose over Cowhouse Creek and began to burn the mist from the Fort Hood countryside. The "opposing" forces, testers and testees, were entrenched in their respective areas and each, as they attempted to catch the warm morning rays, was unable to shake the chill which had begun to set in a few days prior. As the sun continued its sweep across the sky the true heat of a summer day in Texas caused problems for the equipment operators in Mission Oriented Protective Posture IV. The chills deepened, however, as word of yet another transmission failure crackled in over the radio and they thought of the consequences the news implied. Before the week was out the total would reach five.

The Paradox

The hypothetical scenario described above is significant because it has typified the M9 Armored Combat Earthmover (ACE) program for three decades and is at the same time representative of problems other systems currently experience. The implied paradox in the concept of continuous evaluation lies in its contradiction of the prevalent notion that a good test and evaluation program is not continuous but rather has a beginning, a specific objective oriented to the nature of the test at hand, and most importantly, an end. Too many individuals see continuous evaluation as getting stuck in a subroutine of testing that never quite triggers a clean escape to the next milestone and always seems to generate another unprogrammed, unresourced test cycle. Today's failure is tested tomorrow; tomorrow's is tested next week; fix, test, fix; fix, test, fix.

As the following paragraphs will hopefully demonstrate, continuous evaluation need not contradict our goal of streamlining the acquisition process but, in fact, should complement it.

If nothing else, the M9 ACE has survived, if not passed, the test of time. Who could have imagined in 1958, when the original ACE concept was approved, that the first full-production vehicles would not roll off the assembly line until 1988, 30 years later?

Need for Testing

Evolution of the acquisition process has repeatedly reinforced the need for continuous testing. A community of test agencies and independent evaluators now eagerly await each new system as prototypes work their way from proof of concept to fielding. And now, as we attempt to streamline our acquisition process, one aspect of the acquisition process has become clear: testing, to serve user, developer and decision maker alike, must be structured to bridge the transition between program milestones. Successful identification and accomplishment of test objectives, from engineering tests to post-fielding Follow-On Evaluations (FOE), is the key to unlocking the secret of shortening the acquisition process. The M9 ACE program has cleared many obstacles in its nearly three decades of development yet its failures have always seemed to precede it.

A singular problem with the M9 ACE stems from its type classification as Standard-A in 1977 and the inability of the Army to gain needed support and priority to sustain repeated efforts for full production funding. Although this has been attributed to many factors, from budgetary constraints to lack of total Army support, the lack of a sound, continuous, well documented test and evaluation program has clearly been contributory.

The M9 ACE has not suffered from lack of testing. Since early Evaluation and Service Tests, the forerunner to today's Developmental and Operational Tests, the M9 ACE has undergone nearly 18,000 hours of testing. But none of these tests, until FOE last year, were truly "operational" in the sense that we know and accept them today. No Operational Test had ever been conducted. One may argue that earlier testing was conducted per the norm of the day, and certainly before the advent of the Operational Test and Evaluation Agency (OTEA), but today's decisions cannot be based on yesterday's data. Decision makers simply did not have the confidence needed to commit strongly contested resources and the M9 ACE production decision languished. Other systems were pushed ahead in the funding process.

Last year's FOE was undertaken as a final opportunity to address several long-standing issues. Operational effectiveness and reliability, the key concerns singled out by OTEA following the FY84 Initial Production Test, served as the foundation upon which a developer-user-tester task force attempted to structure an all-encompassing evaluation. This first attempt at establishing an "acquisition team" served to highlight the inherent differences in the goals of each participant. The earlier tongue-in-cheek reference to "testers and testees" was more than just literary license. A less than cooperative, often contentious, atmosphere was evident to even the most casual observer of the "team" at work. It took many months and the determined efforts of all concerned to finally forge a consensus and come to the realization that without a concerted, coordinated effort the program would not reach, much less survive, the next round of budget cuts. Team members came to the understanding that they must find a common

ground which transcended parochial concerns and focused instead on the larger Army issues.

PM Responsibilities

It is incumbent upon the program manager (PM) to establish an environment where materiel developers, combat developers, and test and evaluation agencies share the responsibility for identifying test issues and the best means to evaluate them. Timely and accurate identification and resolution of problems is in the best interest of the program. Early recognition and development of these issues can be put to significant advantage especially in terms of supporting the decision making process. Conversely, hidden and/or insufficiently developed issues become targets of opportunity for competing programs, the press and even Congress. Without a predetermined methodology they are likely to generate yet another test loop.

The PM must foster a climate wherein ideas and concepts are freely exchanged. He can make the user, tester and evaluator part of the acquisition team with an implied share of the responsibility for success or failure. He can work with the Training and Doctrine Command (TRADOC) in the development of the Organization and Operational concept, mission scenario and critical operational issues, and he can get on the OTEA team during formulation of test plans. The PM must be prepared to alternately, and sometimes simultaneously, play the roles of team manager, coach, quarterback and even cheerleader.

Since testers are inclined to test, they were provided with sufficient cause for yet another test when the transmission shafts failed during FOE. Few took issue with the position but was another operational test needed or would a hardware oriented test suffice? This pivotal issue could decide the fate of the proposed FY86 program and possibly of the program as a whole. The acquisition team was unable to reach a consensus.

External Resources

The Army Materiel Systems Analysis Activity (AMSAA), an Army Materiel Command (AMC) chartered activity whose forte is applicable to just such situations, was called upon to look at cause and effect of the failures and to recommend a solution. AMSAA was able to determine, and conclusively demonstrate, that the failures were operator induced and that the proposed hardware fix would eliminate the cause. AMSAA was then tasked to design a performance test which was executed by the PM and observed by OTEA and TRADOC. The resulting report substantiated the adequacy of the modification.

The point is, unnecessary testing was avoided by recognizing the availability of external analytical resources.

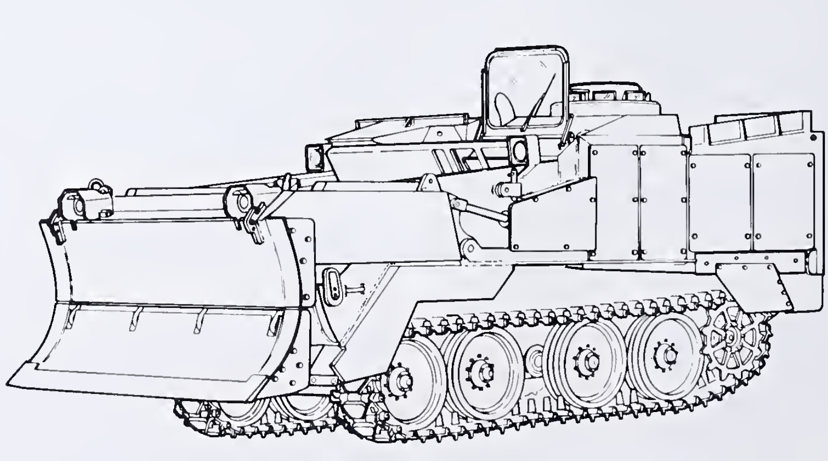
Less than satisfactory Initial Production Testing results, in addition to generating the requirement for FOE, also caused the Office of the Secretary of Defense (OSD) to take notice. Their curiosity piqued by recurring deficiencies, both OSD Developmental Test and Evaluation (DDTE) and OSD Operational Test and Evaluation (DOTE) took an active interest in the program. It was at this point that the M9 Product Manager's Office (PMO) initiated development of a Test and Evaluation Master Plan (TEMP). Although a TEMP is normally required only of major systems, a significant step in the right direction was taken when the M9 PMO compiled theirs. Not only did it bring OSD (DDTE and DOTE) on board, but it forced, for the first time, a complete lay down and evaluation of all testing issues, past and present. It served as the road map to a successful FOE and the resultant FY86 decision to award a production contract.

Key Points

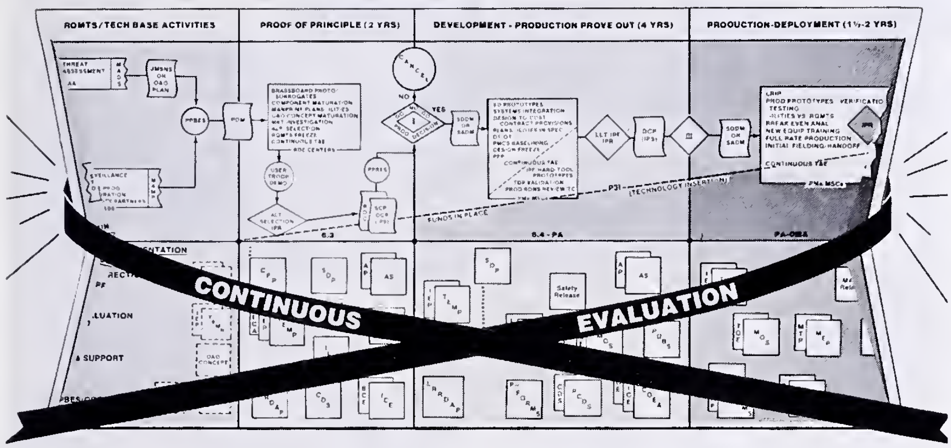
The concept of continuous evaluation must not be visualized as an endless testing do-loop. Rather, it is a process that allows better management of specific program issues and the ultimate advantage of insuring availability of timely, accurate test information during the decision making process. Better, smarter testing, not more testing, will avoid lengthy and needless delays in the acquisition process. Several key points warrant continuous attention:

- Use all the analytical resources at your disposal. Confront an issue squarely, analyze it from all sides, and test only what needs to be tested.
- Testing is vital to the decision making process. It is the common denominator after consideration of need and priority, and separates "bills" from "bill payers."
- Materiel developers must make combat developers and the test community part of the acquisition team, each with an implied responsibility for success.
- A TEMP stands alone as the single most important document in transitioning your program from milestone to milestone.
- A test and evaluation program must be properly timed to insure that the availability of reports coincides with windows established in the Planning, Programming, Budgeting and Execution System.
- Continuous evaluation "starts early and stays late." It is never too soon to lay down your test strategy and never too late to review it for sufficiency. Above all, it must be evolutionary and continually updated to reflect current standards and present day concerns.

Continuous evaluation offers the acquisition team the capability to adapt to a moving technological baseline. It provides the means to insure that future systems are tested in concert with evolving "how to fight" doctrine. Continuous evaluation forces us to recognize that no test can be viewed as an



AMC'S STREAMLINED ACQUISITION PROCESS



independent entity. And finally, continuous evaluation permits us to successfully plan and execute the most difficult test of all—time.

Conclusion

The acquisition team, especially from the perspective of continuous evaluation, is like any other team. Establish your strategy for the season in training camp. Make it flexible enough to accommodate minor setbacks yet long range and farsighted enough to keep the championship in sight. Use each contest along the way to learn from mistakes and build for the next one. Acknowledge that changes are inevitable and be prepared; be proactive rather than reactive. Know the players, from first string to farm club, and where the strength on the bench is. Although the offense and defense do not play on the field together they both must know and understand the complete game plan.

LTC JOSEPH G. PAPAPIETRO has served as product manager of the M9 Armored Combat Earthmover since August 1985. He holds a B.S. degree in management from Auburn University, an M.S. in systems management from the University of California and is a graduate of the Army Command and General Staff College and the Defense Systems Management College Program Management Course.

NSWC Employees Get Special Act Awards

The Army has given Special Act Awards to two Naval Surface Weapons Center (NSWC) scientists who helped solve a battery leakage problem in the M732 fuze.

Research physicist Dr. Jagadish Sharma and research chemist Dr. John C. Hoffsommer received the awards from Robert E. Westlund of the U.S. Army Laboratory Command's Harry Diamond Laboratories.

The problem had threatened both Army and Navy readiness. The M732 fuze is used in both artillery pieces and 8- and 16-inch ships' guns to detonate high-explosive projectiles near their targets. Since three million fuzes were stockpiled worldwide and another million were in production, the leakage also had threatened to cost the Army a great deal of money.

"It was potentially the worse catastrophe facing HDL during my 27 years here—a multi-million dollar catastrophe," said George K. Lucey, Jr., chief of the HDL Systems Engineering Branch.

First, the Army terminated fuze production and inverted or turned the fuzes in stockpile upside down to temporarily halt the leakage. Then it set about to redesign the battery—the source of the leakage. HDL scientists traced the leakage in the battery ampule to a corrosion pitting problem in the PS 115 reserve power supply.

"Surprisingly, the problem had arisen under a unique set of physical circumstances that had not been present during the development phase of the fuze," said Dr. Jeffrey Nelson, a supervisory chemist in the HDL Power Supply and Materials Branch.

To be specific, the corrosion pitting was due to a slow chemical reaction among three usually compatible elements—the fluoboric acid electrolyte, the methylene bromide liquid insulator, and the copper ampule. "Nothing in the literature says this mixture is incompatible," said Nelson.

HDL had to move fast. Eventually, the leakage would render the battery useless and destroy the fuze long before its 20-year life cycle was spanned.

Fortunately, for HDL, the Naval Surface Weapons Center is an adjacent neighbor. NSWC possessed both the personnel and facilities needed to confirm HDL's analysis of the problem—i.e., define the mechanism of failure.

NSWC responded quickly. NSWC assembled an interdisciplinary team, with Sharma and Hoffsommer as the principal investigators, and assigned it to the leakage problem on an overtime basis.

It took the team four months to determine that the pitting corrosion was not due to impure chemicals or substandard materials in the battery, as originally suspected, but was traceable to rough handling after assembly.

The battery has been redesigned to withstand the rough handling, production has been restarted, the condition of the stockpile has been assessed and original concerns about three million fuzes have been reduced to a much smaller number of fuzes.

Now HDL is attempting to determine non-destructive sorting techniques to identify and remove the defective fuzes still in stockpile. HDL has also salvaged batteries previously produced but not yet stockpiled by heating them, a technique that brings corrosion reactions in the energizer to equilibrium without pitting corrosion and prevents any leakage from the ampule.

Army-Industry Conferees Discuss Issues at Atlanta XII

Army and industry concerns related to the materiel acquisition process were discussed during the U.S. Army Materiel Command's (AMC) Atlanta XII executive conference, March 13-14, in Atlanta, GA. Attended by more than 200 senior Army and industry executives, the conference focused on the theme "Atlanta Retrospection—Outlook for the Future."

To increase interaction of the conferees and allow for optimum dialogue, the conference format was changed this year from a series of panel discussions to point-counterpoint sessions focusing on key issues. Co-chairmen of the meeting were Robert O. Black, AMC's principal assistant deputy for research, development and acquisition and Robert W. Truxell, vice president of General Dynamics Land Systems Division.

Retired Army General Henry A. Miley, a former AMC commander and now president of the American Defense Preparedness Association, called the meeting to order. He noted that in 1974 at Atlanta I, the primary concern was on the product produced by the acquisition system while today the concern is on the acquisition process itself. Co-chairman Truxell, in commenting on the conference objectives, applauded the opportunity to examine issues impacting on both government and industry. AMC Commander GEN Richard H. Thompson followed with brief opening remarks, stressing that Atlanta XII was structured around key issues that seem to recur year after year.

The first formal address, presented by BG Jerome Granrud, director of force requirements, Office of the Deputy Chief of Staff for Operations, Plans and Force Development (ODCSOPS), was an overview of the requirements process from the DA perspective. The Requirements Directorate is the focal point for the review, approval and integration of combat development products into the Army structure. Granrud noted that unquestionably there are problems in the requirements process, including the inability to state requirements in logical and defensible terms, and the tendency for requirements to be unconstrained.

Granrud emphasized that there is an orderly requirements process and it can be made to work. He called on the user community to accept minimum acceptable performance levels when writing requirements documents and to get more senior and experienced people involved in the process.

Robert W. Truxell

Atlanta XI Progress Report

GEN Thompson returned to the podium with a progress report on actions implemented as a result of issues raised at last year's Atlanta conference. One of those issues was how to deal with Congressional involvement in the acquisition process. Actions have included providing information to Congress regarding the Army's needs and programs, encouraging industry to establish dedicated managers paralleling AMC on programs of high Congressional interest, and "telling the AMC story."

Other key initiatives to address concerns expressed at Atlanta XI have included:

- working to keep key development programs "sold,"
- earlier recognition of problems,
- improved communication of lessons learned from AMC's Materiel Acquisition Review Boards,
- implementation of the AMC streamlined acquisition process,
- re-emphasis on the importance of locking in the support package to include human factors,
- improving the quality of integrated logistics support data,
- improving warranty implementation concepts,
- injecting realism into contracts,
- communicating innovative contract actions to industry, and
- minimizing use of "multiple" best and final offers.

Thompson concluded his remarks by stating that progress has been made and then opened up the meeting for questions from the floor.

Fraud, Waste and Abuse

Retired Army Major Generals Frank A. Hinrichs and William E. Eicher followed with a report on conclusions of a fraud, waste and abuse seminar, held last December. That seminar, which was addressed by representatives from the Defense Logistics Agency, the Defense Contract Audit Agency, the General Accounting Office, and the DOD deputy inspector general, noted the following:

- Some defense contractors have questionable contract ethics.
- American business has become sloppy.
- Industry needs better internal controls to prevent abuses.
- The number of fraud cases are on the increase.
- Industry abuses are not just simple errors.

• Multiyear procurement and dual sourcing practices are key concerns.

Another featured speaker, Michael C. Sandusky, AMC assistant deputy chief of staff for resource management, presented some AMC "rules of engagement" regarding the Gramm-Rudman-Hollings legislation. Thus far, the Army has attempted to protect military personnel and associated programs in order to maintain force levels and quality.

Procurement Awards

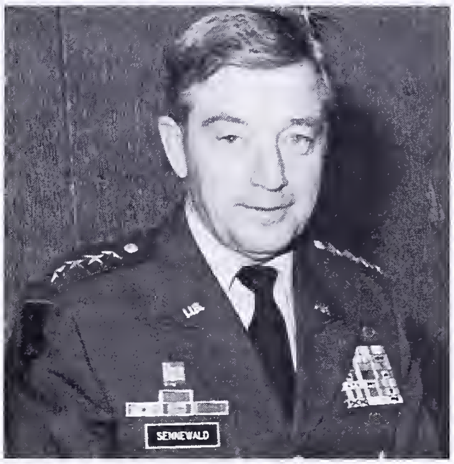
A new feature at this year's Atlanta conference was the inaugural presentation of the Frank S. Besson Memorial Award for Procurement Excellence. Named in honor of AMC's first commander, the award includes a plaque and a $500 check. Presented by GEN Thompson, the award was presented to one individual in each of three categories—civilian, military, and intern. Recipients and their achievements were:

Thomas Douglass, director of procurement in the Installation Support Activity, Aberdeen Proving Ground, MD, was cited for developing and establishing an R&D Support Division to provide a quick reaction contracting capability for sensitive projects. Under his leadership, this organization consistently met its customers' needs. He was also instrumental in carrying out a requirement to convert facilities waste to useable energy.

LTC Robert Schaller, chief of the Natick RDE Center's Procurement Division, was recognized for meeting and beating a host of challenging goals. He initiated the design of a fully automated contract management system and established parameters for future growth that parallel the expected learning curve of the users.

Michael J. Thompson, as an Army procurement intern on various rotational job assignments and special projects, distinguished himself as a valuable member of the Army's acquisition team. He was the principal project officer designated to study the Procurement Automated Data Document System (PADDS). As a result of his efforts, the productivity of the PADDS doubled and the leadtime for small purchases was reduced by 25 days.

Following the awards ceremony, R. James Woolsey, an attorney and partner with Shea and Gardner law firm, provided an update on the President's Blue Ribbon Commission on Defense Management (Packard Commission). Woolsey, who is a member of that commission, noted that the commission believes that the defense requirements process for acquiring new systems is too slow and generates too much paperwork. Among his other key points were: program managers are involved in too many things and are distracted from managing; PMs need more flexibility; there is a need to establish an Office of the Under Secretary of Defense for Acquisition; the role of the Defense Advanced Research Projects Agency should be enhanced, particularly in 6.3 prototyping; DOD civilians need sizeable upgrades in training and experience; and industry should be made to be self-regulating. Woolsey concluded that in his opinion the prognosis for many of these reforms is reasonably good.



GEN Robert W. Sennewald

Luncheon Address

What is the response of the today's field soldier to current Army equipment? This was the subject of a highly upbeat luncheon address by GEN Robert W. Sennewald, commander of the Army Forces Command. In general, soldier reaction to new equipment is very positive. Two items that have received high marks are the M1 tank and the Bradley Fighting Vehicle. Total package fielding has also been highly successful. In a more critical vein, Sennewald indicated that some soldiers feel that more realistic testing with the troops is needed before equipment is fielded. A sterile test environment, added the general, is not necessarily a realistic one. Sennewald also noted that testing should be restricted to that which is really necessary and that the organizational and operational concept must be thoroughly thought out before the Army commits to a design.

Point-Counterpoint Sessions

The first of four point-counterpoint sessions, featuring Army and industry perspectives on key issues, was devoted to a discussion of the structure and effectiveness of AMC project management offices. MG Arthur Holmes Jr., commander of the Army Tank-Automotive Command, presented the government's view. In response to industry criticism that Army PMs don't have enough authority to execute their programs, Holmes stated that in some instances Army PMs have more authority than their industry counterparts. Holmes also summarized both the benefits and risks involved in the PM system.

John R. Myers, president of AVCO Lycoming, provided the industry perspective on project management, stressing that one of the primary differences between Army and industry PMs is that the industry PM is charged with responsibility for profit and losses. Myers also listed several key attributes of a good PM, including demonstrated visible support from top management in order to gain the required power base. He noted that unfortunately the Army is now being micro-managed by Congress, thereby giving many top-ranking Army officers little flexibility.

The subject of the second point-counterpoint session was the streamlined acquisition process. MG Peter Burbules, commander of the Army Missile Command, in presenting the Army's perspective, stated at the outset that the new streamlined process is not a shell game, is not high risk, and is not abandonment of new technology. It is a total approach to materiel acquisition with the goal of getting operationally effective and supportable equipment to the soldier when it's needed. The key to success is to do things earlier and smarter. This requires total commitment by all players.

Industry speaker on the streamlined acquisition process, John J. MacRostie, vice president, Defense Group, FMC Corp., emphasized that the time spent on upfront planning may be the best accelerator of the acquisition process. Included among his key points were: the user community must provide industry with well defined requirements; cost projections must be accurate and defendable, and those who make cost projections must be held accountable; and the Army must provide industry with sufficient time to respond to Requests for Proposals.

The third point-counterpoint discussion dealt with the much debated topic of competition. As a result of recent legislation, industry has reportedly been uncertain about AMC's real policy regarding competition. MG Fred Hissong Jr., commander of the Army Armament, Munitions and Chemical Command, discussed AMC's competition goals and policies, noting that AMC will not compete when it does not make sense to do so. Said he: "Competition must benefit the soldier and his readiness." Recent initiatives to encourage competition have included establishment of competition management offices, development of a competition awards programs, and actions to compete ammunition plants.

Thomas J. Keenan, president of Teledyne Continental Motors, followed with an industry response. Using the analogy of playing a card game to make his point, Keenan stated that the major problem in dealing with the government is that once the "game" is started, the game rules are often changed. The government, he said, is the dealer and calls all the shots. He stressed that the rules of engagement must be known.

The final point-counter session was devoted to the issue of quality. MG Robert D. Morgan, commander of the Army Communications-Electronics Command, discussed some of Army initiatives to insure that high quality products are developed, produced and fielded. One of these initiatives is to get producibility engineering talent into Army RDE centers at the beginning of the design process. He emphasized that the Army has a right to expect and industry has an obligation to deliver quality products.

Dr. Joseph F. Shea, senior vice president of Raytheon Co., stated his general agreement with MG Morgan's comments, but added that the quality problem is sometimes the result of naive people in the the decision-making process in both the Army and industry and others who say "the rules don't apply to me." He discussed at length the merits of the new Department of Defense Instruction 4245.7 (Transition from Development to to Production).

Focus on the Future

The concluding conference session opened with a panel presentation geared to Army and industry concerns regarding the future of the defense acquisition environment. These concerns include legislative and policy turbulence, budget constraints, increasing Congressional oversight, and public scrutiny. GEN Thompson, as the first panel speaker, emphasized that the toughest battle facing the Army this year is the credibility of the procurement process with the Congress and the public. Success, he said, will depend on how well we chart our own course rather than having it dictated to us. Some of his key resolutions are to execute programs in a professional manner, to keep lines of communication open, to enhance capabilities of AMC's workforce, and to improve capabilities to take take advantage of automation.

Dr. Malcolm Currie, executive vice president of Hughes Aircraft, followed with his thoughts on what the future holds for the defense industry. He provided an interesting comparison of the automotive-electronics industry to the defense industry. Currie noted that today's procurement environment is focused on "compliance" to contracts and that in recent years there has been a move to transfer greater risk to industry. Currie expressed concern that trends in the defense business are not good and that these trends may ultimately have an adverse impact on colleges and universities. He concluded, however, that the future does not have to be dismal since the defense community has the capacity to change it.

The third panelist, Norman R. Augustine, president of Martin Marietta, reported on a number of "provocative and disturbing" developments related to contracting, competition, criminalization, and inconstancy. Referring to contracting, he noted that fixed pricing is fine only if certain conditions are met. This type of contracting, he added, will no doubt be good for lawyers. On the subject of competition, he stated that if used in excess, it can have adverse effects. He also expressed his dislike of lumping together the terms fraud, waste and abuse. Finally, he said there is a need for the acquisition community to tough things out when problems arise. Augustine concluded by saying that he wished that he had a happier message.

The final conference addresses were presented by Jack Hobbs, deputy assistant secretary of the Army for systems management, and GEN William R. Richardson, commander of the Army Training and Doctrine Command. Hobbs discussed some of the challenges facing the Army and industry. He called on industry to help the Army by improving the quality of their products, by improving their ethics, and by being more vocal regarding the availability of new technology.

GEN Richardson provided an overview of TRADOC's mission regarding requirements, doctrine, and training and discussed the importance of improved working relationships between TRADOC and industry. He said that the Army needs to do a better job in writing requirements documents, make greater use of nondevelopment items (NDI) and improve front end assessments and concepts formulation. Industry, he added, needs to understand how the Army operates in the field, help define opportunities for NDI, and be open, honest and cooperative. He also emphasized the need for some regulatory changes and the need to change some mindsets.

GEN Thompson, in closing remarks, stated that this was another "great" Atlanta conference. He appealed to industry to inform him of what needs to be done to make things better.

GEN Richard H. Thompson

Doing it Right With the B-1B Program

By LTG William E. Thurman, U.S. Air Force

The following remarks on the Air Force B1-B program were adapted from a speech presented by LTG Thurman on August 16, 1985 at the Army Project Managers Conference in Gettysburg, PA.

This is a great forum to swap lessons learned and experience. Although our programs are very different, we operate under the same basic principle—to build and field effective, affordable weapon systems that we can rely on when we need them.

We've done just that with the B-1B. In fact, it came in five months ahead of schedule, under cost, and performing well.

I'm proud of what we've done, and I want to tell you about it. But first, I want to make clear that I don't advocate that everyone manage their program like we did the B-1B. For example, a new advanced fighter with a state-of-the-art radar and sophisticated avionics that require extensive development would not fit into the B-1B's concurrent schedule and comparatively rigid management approach.

We didn't start the B-1B program from "ground zero." When I took over as program manager, we had nearly eight years of developmental testing experience to draw on. We had four B-1A aircraft with 2,000 flight-test hours and an engine with a lot of development history.

Much of the avionics equipment was available, and all the necessary technologies were in-hand. Aside from the computer, the radar, and some of the defensive avionics, the program did not press the state-of-the-art. We chose the equipment because of its performance —performance that had been verified operationally—which enabled us to choose contractors with a proven track record and defend our budget with confidence.

The president, the Congress, and Secretary of Defense Weinberger specified the objectives--100 operational B-1Bs by 1988 for $20.5 billion in 1981 dollars. This price meant we couldn't make changes that would take more time and cost more money. The design philosophy was to build an effective airplane, including all the logistics elements necessary to successfully deliver and support it, as fast and as economically as possible.

Our biggest challenge was logistics. We didn't have any logistical carry over from the B-1A Program. Logistics had been deferred as a cost savings initiative and only initial planning work for support equipment, technical orders, and spares, had been accomplished.

What to do? First we had to find out just how big the job was. For that task, we decided to use Logistics Support Analysis (LSA). I know that to the Army, LSA isn't new. But, we had never used it on a major Air Force weapon system. The analysis was startling. It showed we needed 460,500 different spare items; 4,800 pieces of support equipment, 3,300 of which were peculiar to the B-1B; and about one million pages of technical orders!

Our acquisition strategy for these support elements mirrored that of our airframe and avionics. Early on, we began monitoring our logistics effort closely. All of our program reviews included a full assessment of our progress in developing appropriate support for the new bomber. This was to prove one of the most important decisions we made.

Concurrent research and development, production, and support acquisition was a tremendous challenge. However, it gave us the opportunity to see development tests and maintainability problems at the same time. That way we could resolve problems before they became a fleet-wide epidemic. We did just that when Air Force crew chief sergeants on the production line at Rockwell's main assembly plant in Palmdale, CA, let it be known that they would have to remove the entire internal weapons stores to replace a malfunctioning flight-line replaceable unit. Needless to say, we got that piece of the design changed.

For the first time on a major aircraft weapon system, we were our own general contractor. We managed four associate contractors: Rockwell International (airframe and overall design integrity), Boeing Military Aircraft Co. (offensive avionics, integration of all avionics, and controls and displays for the defensive system), Eaton Corp.'s Airborne Instrumentation Lab (AIL) Division (defensive avionics), and General Electric's Aircraft Group (turbofan engines). Our office, the System Program Office, or SPO as we called it, managed the development, concurrent production, flight test, and support development programs.

Being the general contractor put us in the middle of the decision making process. We got to see problems at a level of detail that the Air Force wouldn't normally see. For example, when an associate wanted to change his part of the program, we were the ones to ask questions like: Is the benefit worth the cost? How is it going to change the over-all schedule? Will it affect another contractor adversely? The result was a disciplined program. We learned changes that came from this rigorous inquiry actually reduced the life cycle cost of the airplane.

How then did we manage in this environment? To begin with, we set up a visible communications system. It included a reporting chain, called the "red streak," which ran from us to the secretary of the Air Force to the secretary of defense. We met bimonthly in the secretary of defense's office. That way he was kept completely current about progress and problems and we had his continuing attention. Whenever we would get requests to modify the design, we would mention the suggested changes to him, show how they could change our budget position, and ask him what he wanted us to do. His position from the start was to hold the baseline. Awareness of his policy grew, which helped to reduce the "innovative" proposals to a manageable size. It also enabled us to control the schedule and the budget. Programs had been baselined before, but I don't believe the baseline had ever been protected at such a high level.

Our communications system in-

cluded weekly management reviews, cost performance reports, performance measurement data, and variance analysis reports. These reports, used by our contractors and the SPO, provided the data for all reports, including the red streak. The availability of this constant stream of data to all the players made it impossible to hide bad news. We also had a lot of high level meetings with the chief executive officers of our associate contractors. That was an idea started by my boss, General Skantze, when he was running Aeronautical System Division several years ago.

One payoff from this open and timely communication came from altering the design of the aircraft's tail warning system. The B-52 system (made by Westinghouse) that was to go into the B-1B would take up too much space, weigh too much, and require too much power. The Boeing/Rockwell/AIL solution: Drop the B-52 approach and develop a B-1B unique system by integrating one additional antenna and control box. We did just that by using a modification to the Eaton defensive avionics system. As a result, we expect to save up to $50 million.

We worked hard on teamwork. Consequently, the team usually found a better idea when we got into a bind. I'm reminded of the time when one of our engineers, MAJ Jim Hickman, suggested modifying a rotary launcher to accommodate all the nuclear weapons and short range attack missile. The original concept had been to have a variety of launchers for a variety of different weapons. He worked directly with the Rockwell engineers and they reduced it to a single system to do both jobs. I think that saved $15 million or $20 million in direct costs. When the cruise missile capability came up, Jim worked to develop a single pylon that will carry any kind of cruise missile. That saved $40 to $50 million in design and testing costs alone.

Other team members were just as creative. For example, Strategic Air Command (SAC), the users of the B-1B, said that they wanted an aircraft with the offensive and defensive systems tied together. We said coordinated countermeasures sounded expensive and difficult. SAC persisted. We challenged the team members to find ways to do what SAC wanted without disrupting the budget or the schedule. This perseverance paid off. We quickly discovered that it was quite simple to marry the two systems through software. We were also surprised when we realized that this new capability—to give the aircraft a weapons system with logic that could use all the information from the defensive avionics to attack or avoid threats—wasn't going to cost millions—just $150,000. It didn't even change the contract.

Teamwork helped create esprit de corps, which in turn, motivated everyone to produce a quality product at low cost. I remember our director of manufacturing, COL Lavelle "Pepe" Prine, went on a crusade to get quality and reliability goals included in our contracts. The contractors initially said that the goals we wanted to put in would cost a great deal of money, so we had decided to leave them out. Then Pepe convinced the contractors that quality up front would eliminate waste and rework and increase profits. He was so persistent that our contractors devised new approaches and shared techniques principally to get Pepe off their backs.

Another initiative was to establish credibility with the taxpayers. Working with senior executives and public affairs people from the contractors, we established a policy that, within the constraints of classification, we would be open and candid with the press—regardless of their affiliation.

As you can see, the breadth of this enormously ambitious program stretched the creative talents of us all. We managed $20.5 billion, four associate contractors, and over 5,000 subcontractors and suppliers. We had to find a simple way to do business. An uncomplicated organizational structure and straightforward lines of communication worked best. The SPO was the smallest one ever to be assembled for a major Air Force weapons system at the Aeronautical System Division. We didn't need a larger office because our intention was to rely on others. For example, we asked Logistics Command to do the bulk of the support work; the users, Strategic Air Command, to validate technical orders and to avoid the "it won't work" criticism later on; Air Training Command to give us innovative design concepts for affordable training equipment; and of course, the contractors to do it right the first time. We delegated a lot of work to the Air Force plant reps for monitoring contractor performance and to the Air Force Flight Test Center at Edwards AFB for conducting and reporting on the flight test program.

Our commitment to building the B-1B within the time and cost constraints demanded that we control what we bought. We learned that no manufacturer is going to say, "No, I can't do it." He'll always gamble on the hope that he can indeed find a way. We had to become more involved than the arm's length way of dealing with industry that we had used in the past. We became more informed on the actual capabilities and potential capabilities of our contractors. We asked questions like: How are you going to build this? What materials are you going to use? What equipment will you need? As far as facilities and use of technology are concerned, I believe that the B-1B program is setting a pattern for aerospace production in the future. In the past, we've tended to concentrate more on capability and less about cost. But with the price of weapon systems these days, cost becomes increasingly important. Encouraging people to think, to use their common sense and to be creative, helps to hold the line on costs.

The B-1B became a symbol of American high-tech resolve—an example of thoughtful, careful defense management to meet a well documented threat. Everyone involved in the program—chief executive officers to clerks—understood the importance of our $20.5 billion program baseline. They resolved to make the program a success. And they did. In less than three years, we delivered the first airplane to Dyess AFB in Abilene, TX, ahead of schedule and under budget. But perhaps the best indicator of our success came in 1985 when Congress for the first time in more than decade did not offer an amendment to kill the B-1 Program. The efforts of the team approach were finally being recognized.

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Coordinating Army and Industry R&D Programs

By Dr. Karl Bastress

In 1983, as LTG Robert L. Moore assumed the position of deputy commanding general for research, development and acquisition of the Army Materiel Command, he directed that Army R&D programs be coordinated with industry independent R&D (IR&D) programs. The purpose of this directive was to avoid unnecessary duplication between the two R&D activities and to achieve synergistic benefits through coordinated planning.

Coordination with IR&D programs is a significant change in R&D management for the Army. Army R&D managers must focus their efforts on planning and execution of Army-funded programs since that is their primary responsibility. Developments from industry programs are incorporated into Army programs as they appear but heretofore a detailed familiarity with IR&D programs has not been required. The coordination requirement changes the perspective of the Army manager and increases the scope of activities under his surveillance.

What are the Army R&D and industry IR&D programs and how do they relate? How can they be coordinated and what benefits can be expected from coordination? This article addresses these questions.

The Army RDTE Program

The size of the program and its relationship to other federal R&D programs are indicated in Figure 1A. For fiscal year 1984, Congress appropriated $4.2 billion for Army equipment development representing 15 percent of the defense R&D budget and 9 percent of all federal R&D programs in that year.

The Army RDTE program, as shown in Figure 1B, is performed jointly by industry, universities, federal contract research centers (FCRCs), and Army laboratories with industry performing the largest share through contracts with various equipment development commands. Overall RDTE program coordination is provided by the director of Army research and technology at DA with detailed management by the Army Materiel Command (AMC), Army Medical R&D Command, Corps of Engineers, and the Army Research Institute for Behavioral and Social Sciences. AMC is responsible for approximately 80 percent of the program.

Industry IR&D Program

A second major R&D effort contributing to Army equipment development is conducted by industry as a part of its independent R&D activities. This effort is planned, funded, and performed by companies to develop new products and capabilities to enter new markets. The magnitude of this industry R&D effort, as indicated in Figure 2A, is comparable to the overall federal R&D effort. Most IR&D in 1984 ($45.5B) was funded by 820 large corporations.

How much of this industry effort is relevant to military equipment development? That portion is difficult to determine because the content of these programs is private information and generally not accessible outside each company. Also, much of this R&D effort is of a generic nature and not uniquely related to either military or non-military applications.

However, there is a part of this industry R&D effort which is primarily oriented toward military applications and, for reasons explained below, is accessible by the military services. This is the R&D performed by major defense contractors independent of work performed under DOD contracts. The magnitude of this effort in 1984, as shown in Figure 2A, was approximately $5.1 billion. An assessment performed by the Army indicates that approximately 20 percent or $1 billion of this effort is directly relevant to Army requirements (Figure 2B). Advances in technology and improved products flow continuously from IR&D.

The Army-relevant IR&D is an important adjunct to the Army RDTE program. It serves as an additional source of new technology and improves the capabilities of the defense industry to provide improved equipment for the Army. Considering both the Army-relevant IR&D and the portion of the Army RDTE program performed by industry

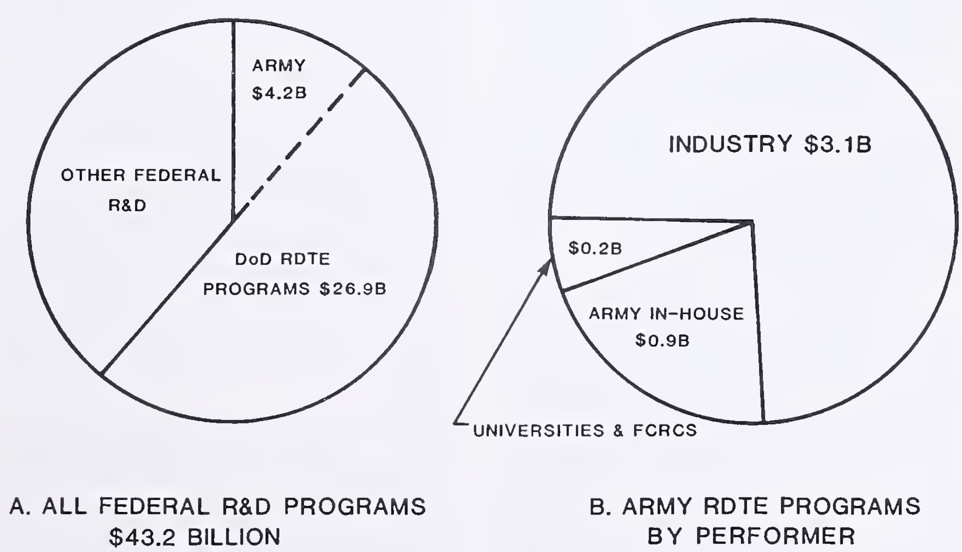

Figure 1. Federal R&D Expenditures in Fiscal Year 1984.

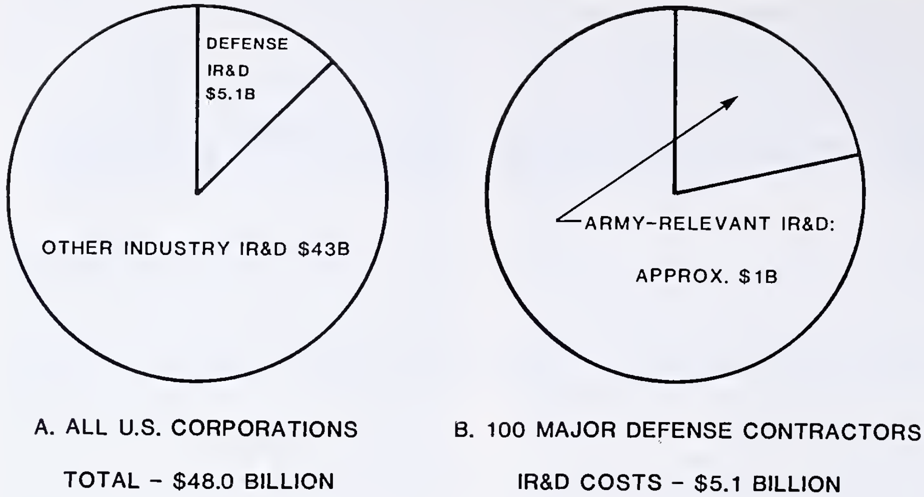

Figure 2. Industry IR&D Expenditures in 1984.

under DOD contracts, it is clear that industry plays a major role in Army equipment development.

IR&D Funding

The Army, as well as the other services, has access to information on IR&D programs of major defense contractors as a by-product of an action by the Congress to control IR&D costs borne by the government. Costs of IR&D efforts are recovered by companies, whether engaged in defense or non-defense work, through income from sales of products or services. The price of each sale (on average) must include all costs of doing business plus some amount of profit. IR&D costs are recognized by the federal government as legitimate business expenses and are accepted as allowable overhead costs on contracts with the government. The Army, like other government agencies, expects to pay its share of allowable overhead expenses incurred by its contractors, including IR&D expenses.

In 1970, the Congress acted to limit the amounts that companies recover from the government for IR&D costs to "reasonable" levels. That act requires that any company recovering more than a threshold amount in any year must, in the next year, negotiate with the government to establish a ceiling on its recovery during that year. At the present time that threshold is set at $4.4 million for the combined recovery of IR&D and bid and proposal costs. About 100 companies exceed that threshold and must negotiate cost recovery ceilings each year. These were the companies mentioned earlier as having expended $5.1 billion on IR&D programs in 1984. Of this amount, $1.7 billion was recovered through sales to DOD and approximately $300 million of that amount was recovered from the Army. The remainder of the $5.1 billion expense was recovered by these companies from proceeds from commercial sales or from internal resources.

As a part of the ceiling negotiation process, DOD is required to evaluate each company's IR&D program for technical quality and relevance to military functions. It is this feature of the process which allows the Army and other services to have access to information on IR&D programs of major defense contractors.

Army Evaluation of IR&D Programs

The Army participates with the Navy, Air Force and NASA in evaluating IR&D programs and is responsible for managing evaluations of companies which have the Army as their principal government customer. These companies include most manufacturers of military ground vehicles, helicopters and communications equipment, and selected manufacturers of missiles and electronics systems. The primary evaluation mechanism is a review of an IR&D technical plan submitted annually to DOD by each company. This evaluation is supplemented by an on-site program review generally held every three years.

With guidance from the government IR&D manager, the company prepares its technical plan and distributes it to designated DOD and NASA laboratories where it is evaluated by scientists and engineers with expertise in the areas covered by the IR&D program. During this process the technical plans are treated as proprietary information and protected against unauthorized release outside the government. Written evaluations from laboratory staff members are forwarded to a lead laboratory where they are consolidated into a technical evaluation report. This report is reviewed with the company and then is forwarded to the IR&D manager and negotiator for use in negotiating the ceiling on the company's IR&D recovery during the next year.

As mentioned above, the evaluation process serves the statutory requirement for supporting the ceiling negotiation process. However, the evaluation provides a more far-reaching benefit in establishing a technical information exchange between industry and government R&D personnel. The government learns about the content and accomplishments of IR&D programs while industry benefits from reviews of its programs by government scientists and engineers. The exchange also serves as one of several processes through which DOD keeps industry informed of its technology requirements and priorities.

Coordination of Army and Industry R&D

The initiative by the Army to coordinate its RDTE program with industry IR&D programs is not an entirely new concept. There has always been an extensive interchange of information on R&D activities between the Army and industry, and a degree of coordination already exists, particularly on the industry side. Industry R&D managers watch the Army RDTE program as one measure of the levels of Army interest in various areas of technology, and there is a tendency for industry to pattern IR&D funding after RDTE funding by the Army and other services. In addition, many companies plan their IR&D projects to supplement contract R&D projects and to lead to future contract R&D and procurement programs.

On the government side, however, there has not been a consistent or continuing effort to take IR&D programs into account in planning RDTE programs. By coordination of its RDTE program with relevant IR&D programs, the Army hopes to achieve the following:

- reduce duplication of effort in development of systems or components which are intended to serve similar functions;
- enhance technology base pro-

grams by sharing information between industry and government laboratories on R&D project objectives, approaches and progress; and

- stimulate additional industry IR&D investment in areas of high interest to the Army.

In working toward these objectives, however, the Army will not attempt to redirect industry IR&D programs; that is, the independence of IR&D planning by industry will be preserved. Also, the proprietary nature of IR&D program information will continue to be protected; coordinated R&D planning by the Army will not result in public release of information on industry programs.

The focus of the Army's coordination effort is on its RDTE program. Actions to achieve the objectives of coordination will be limited to changes in the RDTE program. However, the Army will continue to provide advanced R&D planning information to industry for use in IR&D program planning.

Approach

The approach being taken by the Army to coordinate its RDTE program with industry programs requires detailed knowledge of IR&D programs and use of that knowledge in planning the RDTE program. Specific steps being taken in the coordination process include assessments of IR&D projects, correlation of IR&D projects with RDTE projects and objectives, and management actions to achieve coordination objectives through RDTE program changes.

These actions are executed in synchronization with the annual review process through which the Army RDTE program is developed and have become integral parts of that process.

Integration of IR&D Projects

The assessment of IR&D projects forms the base for integrating IR&D project information into the RDTE program. This assessment is a continuing process performed by staff members dedicated, at least part-time, to the function. The project assessment coordinator maintains cognizance over company IR&D programs which contain projects related to the mission area of the coordinator's organization. His primary information sources include the written technical plans distributed annually by the companies and a data bank of information on IR&D programs maintained by the Defense Technical Information Center (DTIC). The DTIC IR&D data bank contains only summary information on IR&D projects but can be searched readily to identify projects in particular areas of technology.

The assessment function is a major task; over 200 IR&D technical plans are issued each year by divisions of the 100 corporations participating, and these plans describe over 7,000 projects. (One complete set of the 200 technical plans occupies about 75 feet of shelf space.) Clearly, the IR&D project assessment coordinator must invest a considerable amount of time reviewing projects even if his area of interest is limited.

Relating IR&D projects to new systems in development—the second step in the coordination process—is conducted in conjunction with the preparation of mission area materiel plans. Information on each project which supports a system is compiled in a standard format identifying the system and briefly stating the supporting role of the project. All IR&D projects are not included in the compilation since many do not support Army systems, but many projects support more than one system.

Management Actions

In the final coordination step, management actions are taken to utilize the IR&D project information, and the R&D manager bases his actions on integrated technology summaries (Figure 3).

Typical management actions include:

- consideration of the state of IR&D technology in decisions to start system development and to set system performance goals,
- modification or elimination of RDTE projects to reduce duplication or to create complementary projects, and
- initiation of R&D contracts to stimulate and support IR&D efforts in critical areas of technology needed for specific systems.

These actions may be taken during the formal review of the RDTE program or at any other time of the year. Having information on IR&D projects available in system-related form facilitates the process and promotes coordination between the two R&D areas.

Future Initiatives

The current initiative by the Army to coordinate its RDTE program with industry R&D programs was started in 1984 and became fully implemented in 1985 in conjunction with development of the 1986 RDTE program. To improve RDTE and IR&D coordination and to extend the process to other R&D areas, new initiatives have been started or are being considered:

- Electronic data processing will support integration of IR&D project data with RDTE program data. Approaches to accessing and classifying IR&D data are being evaluated as a first step in this initiative.
- Incorporation of information on industry programs in manufacturing and production engineering is being considered. This category of industry effort is not classified as IR&D and, therefore, is not reported to DOD in IR&D technical plans. However, some companies have volunteered to share information on this work.

Extension of the R&D coordination initiative, to include foreign R&D pro-

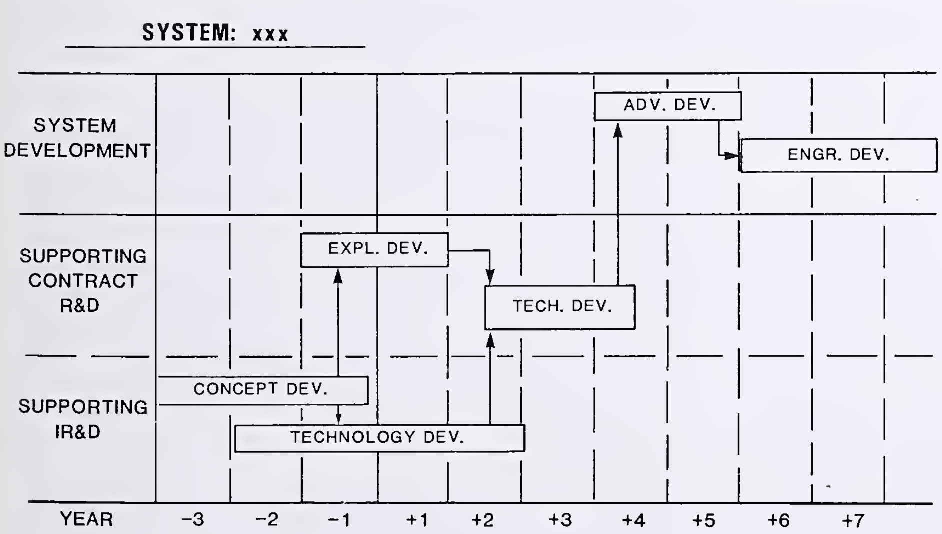

Figure 3. Technology Management Summary.

grams, offers substantial benefits. Sharing R&D data with other NATO nations could save an estimated $25 billion in R&D costs among those nations by allowing duplication of R&D projects to be reduced. However, impediments to sharing among foreign nations stemming from export controls are also substantial. Thus, this initiative may proceed more slowly than others.

Summary

The Army recognizes industry IR&D as an important adjunct to its RDTE program and expects that coordination will reduce unnecessary duplication of efforts. The Army is increasing its efforts to keep industry informed of R&D priorities and requirements to provide guidance in IR&D program planning. There is no attempt by the Army to direct industry IR&D programs; coordination is being achieved primarily through changes in the Army RDTE program stemming from an awareness of IR&D program objectives and progress. Finally, interactions with other industry R&D activities and foreign R&D programs are future Army goals.

These management actions are broadening the perspectives of Army R&D managers and are extending the resources accessible to them in developing new and improved military equipment.

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DCAA and the Army Train Together

On Sept. 20, 1985 the Defense Contract Audit Agency (DCAA) and the U.S. Army agreed to a Memorandum of Understanding that initiated the DCAA Contract Audit Training Program for U.S. Army procurement and technical support personnel. The program resulted from the Army's overall effort to continually upgrade the expertise within the procurement /production career field.

The initial program started with three positions in October 1985. Three additional positions were approved in April 1986 and four more are slated for July 1986. Functional Area 97 Officers selected for the program are required to be in the grade of captain through lieutenant colonel and have completed basic through intermediate accounting courses (preferably with additional auditing and cost accounting background) or a degree in a technical speciality, such as data processing or industrial engineering, or an appropriate combination of experience and education.

Each officer spends 12 months in a training position followed by a three-year assignment at a procurement command. The program requires that officers receive the same training and supervision that is provided to an entry level DCAA auditor. The focus of the training is for the officer to become involved and productive in the DCAA functions in order to transfer that knowledge into future assignments.

To accomplish the program goals, the officers are under the direct supervision of the DCAA supervisory field auditor while remaining subject to the administrative control of the Army. Civilian clothing is worn in lieu of uniforms and, for all practical purposes, the officers are considered employees of DCAA.

The St. Louis Branch Office was selected as a training site because of its proximity to several major procurement commands. During the first three months of the program, the author has completed several prescribed self-study courses as well as two forward pricing proposals, two final voucher audits, and has assisted on a billing system and related progress payment audit, an estimating system review, and a comprehensive labor audit. Not a bad start.

In addition to the obvious benefits to the Army, the program allows nearly every auditor in DCAA to potentially gain something. One of the main advantages is that in the near future DCAA audit reports will be received by DCAA trained officers working in the procurement activities (procuring contracting officers and supervisors, and contract cost analysis branch chiefs). These officers will have a better understanding of DCAA's role and will more fully utilize the auditors and their reports in the pre- through post-award process. A secondary benefit of the program is that DCAA auditors will be able to increase their knowledge of the operating procedures of a procurement command from work-related conversations with the officers.

As it now stands, the program provides training for 10 officers per year, and offers many expansion opportunities. These may include adding Air Force and Navy personnel and civilian procurement personnel, as well as increasing the number of trainees per year. An equally beneficial option would be to have DCAA auditors train at procurement commands. In this process, the auditors would become more fully aware of the buying process.

The Army and DCAA must work as a team and this program is promoting that concept. Better buys through smarter buys; smarter buys through smarter buyers.

The DCAA training program is being managed by the FA 97 Proponent Office, similar to the Training with Industry Program. Officers interested in participation should contact the FA 97 assignments officer on AUTOVON 221-5210 or the FA 97 proponent on AUTOVON 284-8125. In addition to the DCAA St. Louis program described above, training positions exist at Warren, MI, Huntsville, AL, Mountainside and Princeton, NJ, Rockford, IL, and Philadelphia, PA.

The preceding article was authored by CPT Edmund G. Herald, a participant in the DCAA Contract Audit Training Program.

Foreign Dependency in Military Purchasing

By John Larry Baer

The following remarks, edited for magazine format, were originally presented at an American Defense Preparedness Association Metal Parts Section meeting in October 1985.

Introduction

Is there a dependence on foreign sources for some of our military and commercial hardware? Yes, there is, but my thesis is that while it certainly exists, it is not egregious. It is something which is becoming universal, if it is not already, but I believe it is something we can live with. In this article, I propose to give you some ideas how.

There are a few items of military hardware which depend largely on foreign sources—some for parts, some for raw materials and some for the entire system. For example, there is a laser range finder in the Army Helicopter Improvement Program (AHIP) thermal imaging system that is made by a father and son team in a little shop in Scotland. There is also a cryogenic cooler for the AHIP that is made only in Germany. The laser filter glass for the M1 tank is made by the German Firma Schott, but fortunately in their Duryea, PA, factory. But for how long? What if economic pressures prevail?

The cobalt, chromium, nickel, titanium and niobium used in the M1's famous heat exchanger recuperator plates all come from off-shore, some of it from countries with whom we're not exactly on friendly terms. The zircon sand for our Combined Effects Munitions and Sonobuoys comes from Australia—a friendly country, but pretty far away if we need the stuff in time of war.

Under the off-set program, many of the subsystems for our F-16 and F-18 aircraft come from far away places like Australia, Greece, Israel, Korea or Spain. Of course, many of those suppliers are backed up by U.S. manufacturers who fill at least 50 percent of our requirements. They could increase their output in time of war.

Sometimes we get major parts off-shore. For example, the aft section of the AV-8 Harrier is shipped from England to St. Louis for assembly with the nose and mid-section.

Occasionally we get a whole system, like the AR-5 Chemical Protective System that the Marines are buying from a British consortium because no one in the U.S. could make a system that met their needs. Other examples are an Italian handgun and a Belgian machine gun.

In many cases, in both military and commercial procurements, we buy parts off-shore because their quality is better and more predictable. Sometimes it's a machine tool that we can get from off-shore sources in three to four weeks (usually modified to meet or exceed our precise needs) while the American manufacturer wants eight months to a year to deliver—to his specs! But often as not the determinant is cost.

Sometimes it's not just a question of price or delivery. When Goodyear built a common carrier pipe line system that required 30-inch thin wall pipe with low residual magnetism for connecting off-shore California oil fields to Gulf Coast refineries, they turned to Belgian, French and other overseas steel makers for 300,000 tons (two-thirds of their needs). They found that none of the three U.S. steel companies that bid for the job was fully able to meet the specs and Goodyear had to wait while they reopened a mothballed plant and hired and trained new labor.

Some of you may recall that in September 1982 the Army conducted a survey of all its manufacturing technology offices to identify where we were dependent upon foreign technology, machinery or components. We identified some 140 items such as silk lacing cord for propellant bags from Japan, Taiwan and Korea; Monton wax from East Germany which is used as binder in the 120mm XM830 projectile explosives; pinacolyl alcohol from Poland; and carbide hobs for mechanical time fuzes from Switzerland.

That's just in the area of metal parts and munitions components. But remember almost all munitions today contain electronics and a lot of those chips come from off-shore. Intel of Santa Clara, CA, supplies the microprocessor "brains" of IBM and IBM-compatible machines, but Japanese producers have driven Intel out of all but a tiny niche of the DRAM computer chips that Intel invented. And guess who's right on their tail—the four tigers! Hong Kong, South Korea, Taiwan and Singapore are right there on Japan's heels, often making products bearing Sears, Mattel or IBM labels. In TVs they're competing with Sony, RCA and Zenith; also in tennis rackets, in cameras, and in apparel. But right behind the four tigers are China and Thailand who have lower wage rates and are trying to build a reputation for quality goods.

And now we begin to get to the crux of our problems: lower labor costs in the Orient and better technology implementation in both Europe and Asia.

The danger is that once we come to rely on a foreign source and the U.S. manufacturer no longer finds it rewarding to keep on producing for a limited market (such as the U.S. military) we may get locked into a foreign supplier by default—and de fault will be ours.

Identifying Foreign Parts Requirements

While much of the problem is in learning how to live with foreign inputs to American military systems, an essential element of the learning process is first to know what parts, raw materials or subsystems have been identified by the design engineer as being potentially or critically foreign sourced. There are several reviews built into the Army system development cycle which, while they exist, are not always fully adhered to.

There is the Design Engineering Review, initial and final production readiness review and other management check points which are specifically designed to clearly identify all foreign and/or sole sourced parts. Also, the Army Materiel Command (AMC) has its production base study item analysis sheets as well as a report that the Industrial Base Engineering Activity publishes annually to identify all critical foreign and sole sourced parts for each system.

Unfortunately, foreign parts are not always identified during the cited reviews and, even when they are, findings may be ignored so as not to interfere with the timely fielding of the system under review. But the identification system is there if we want to use it. When we identify the parts, we have to decide what is the best way to procure and integrate them into the system.

Competition

Whether we call it "healthy competition," (that's when another country faces an off-shore challenge), or "virtual foreign dominance," (that's when we face the challenge), we can't deny that competition exists. The bearing industry tells us that imports comprised 53 percent of the bearings used in the U.S. in 1983, primarily in the lower end of the market in terms of dollar value. In other words, the high cost, specialty bearings are still successfully made by U.S. manufacturers.

Survival

I'm afraid that in order to stay competitive we may have to do one of two things, and maybe both selectively. The first thing is to modernize.

We've heard it ad nauseum. Too many times we've read that the vice president of General Electric told his audience that we have to automate or emigrate. None of us is prepared to go up the chimney in smoke just yet. But there is a limit to the amount of money we have to modernize. We've all accepted by now that automation and its concomitant high costs cannot be justified merely on the expected six, 12 or 18 months return-on-investment.

How do we modernize? My belief is that the best way to modernize so that the results are in the best interest of both private industry and government, is to use the Army's Producibility Engineering Program (PEP). The program, according to Darold Griffin, the Army Materiel Command's deputy chief of staff for production, incorporates the best features of the old Advanced Production Engineering (APE) program as well as manufacturing methods and technology.

I believe that we, as the industrial arm of that much maligned military-industrial complex, have the capability and the responsibility to make our military hardware more cost effective. To do so we have to remain competitive with metal parts manufacturers overseas, our brothers and sisters in arms. Only in that way can we achieve the real DOD objective and bring the manufacture of critical parts back to our shores.

Teaming Up

The second thing we must do to stay competitive is "team up." The key to survival in this highly competitive, very sophisticated market, is a good teaming arrangement. Litton Industries bought a 14 percent equity in Gildemeister, a West German maker of computerized, flexible manufacturing systems, sharing markets and technology with them. Houdaille now has extensive marketing and licensing agreements with German, French, English and Italian equipment fabricators.

MAAG in Zurich had computer-controlled sensing and feedback on their gear-grinding machines while we were still making manual adjustments, and Messerschmidt-Bulkow-Blohm had a computer-controlled milling cutter sharpening, storage and transport system as a part of their computer integrated and automated manufacturing system in operation in Augsburg in milling Titanium Tornado parts well before we thought of using such a system. Further, one of the earliest, cost effective flexible manufacturing systems was installed and operational at a Fiat plant in Italy in the 1970s.

By teaming up with off-shore suppliers who use the latest, best and most cost-effective technology we not only harness their capabilities, but we also learn from them. Of course, truly effective limiting of our foreign dependency really requires U.S. licensing of these foreign processes. But that can't always be done.

Using Foreign Parts

A less drastic step than teaming with a foreign competitor, if that doesn't sit too well with management, is to use low cost foreign sourced parts as an input for the American product. Rather than losing the whole job, or going through the admittedly difficult task of cooperative production with the (feared and despised) foreigner, there is the option to sub-contract certain high production rate, low cost parts, especially those requiring a high labor content.

Understanding Foreign Competition

We are no longer facing Bret Harte's "devious Chinaman" across the card table. We are dealing with highly skilled, well organized technocrats. Do we have a well defined, highly articulate, American national industrial policy plan which carefully defines projects and where they plan to excel, as Japan's Ministry of International Trade and Industry has published? There's hardly an area of technology from ceramics and electronics to lasers and automated machining where they don't have well defined goals.

We need to understand those goals, to recognize sources of foreign competition, and to appreciate their modus operandi, strengths and weaknesses, before we can even begin to think of sitting down to work with them.

Before we approach a foreign competitor to consider setting up a cooperative working agreement, whether he speaks our language or not, we've got to study him, know his product and his methods of operation and above all, to learn a bit of his language or hire someone technically qualified who speaks his language and knows his customs. Arrange to visit him to put you in a better position to suggest a teaming effort.

Whether it's in Europe or the Orient or the Mideast—lack of this kind of preparation will almost certainly doom to failure what will doubtless be an expensive, nerve wracking, time consuming effort. As in any marriage, we must be prepared for give and take with a future partner or again expect to fail. And when you run into a problem with your foreign teaming partner, as you do occasionally even in the best of marriages, for pete's sake do not send your lawyers over there. They don't want to see your lawyers—send your engineers and technicians. They're the ones who can clear up the technical problems.

Labor Relations

All the noble preparations in the world and cooperation from a potential off-shore supplier or team partner will fail unless your employees know that success depends upon them and that without their active cooperation and participation the foreign teaming effort is likely to fail and they will very likely be unemployed. They must be made aware of the extent and degree of foreign competition, and what it means to them to either turn out a competitive, high quality product or lose the market and their job with it. I cannot emphasize this aspect of employee participation strongly enough because that is the area where many glorious and oth-

erwise well thought-out plans have totally fallen apart. Your employees can make a success of your modernization or they can wreck it.

We don't have a choice any more. It's a shrinking world of high speed communication, relatively high speed transportation and stiff competition. Whether we like it or not, we are dependent to a greater or lesser degree on foreign competitors and suppliers. We either learn to work with them or go under.

JOHN LARRY BAER is a registered professional engineer with extensive experience as a consultant in the fields of manufacturing technology and and engineering management. He formerly served for 31 years in government service and holds bachelor's and master's degrees in chemical engineering and an MBA degree.

Contract Support for Deployed Forces

The date and time are unimportant. The place is one of those countries which, although it may not have a wealth of strategic natural resources, is strategically important in the scheme of the world's status quo. With camouflaged faces and wearing uniforms which blend with the desert or the jungle, they leap from the planes or storm ashore from the landing craft. The United States has deployed forces in response to a contingency. Among the combat troops are the military contracting officers.

Contracting officers assigned to the Office of the Assistant Chief of Staff, Materiel, 1st Corps Support Command, Fort Bragg, NC, have the mission of providing contract support to U.S. forces deployed outside the continental United States (OCONUS) during exercises or contingencies. To date, these officers have deployed with and provided contract support to units of the Army, Air Force, and Navy in the islands of the Caribbean, jungles of Central America and deserts of the Middle East.

Contract support is vital to the deployed forces, as often the normal military logistical system is not in place or cannot provide, in a timely fashion, the supplies or service needed. The contracting officers fill this void, ensuring no degradation occurs in the combat capability of the forces.

School-trained as procurement and production officers (Specialty Code 97), the contracting officers are warranted (authorized) to legally obligate the U.S. government. Their "bibles" are the Federal Acquisition Regulation (FAR), the DOD Supplement to the FAR (DFAR), and the Army Supplement (AFAR). These documents prescribe federal and Defense Department policies and procedures for obtaining goods and services. Unfortunately, they are written with the relationships between the U.S. government and U.S. contractors in mind. Most sections are not applicable OCONUS and there is no guidance whatsoever on contracting in hostile environments (i.e., actual combat zones or where no formal relationships exist between the U.S. government and the government of the foreign country). Compounding the problem are the facts that the military contracting officer can influence the good or bad will of the foreign government and the local population through his actions/misactions when obtaining goods and services, as well as the failure on the part of some commanders to realize they are no longer in the United States.

It is a problem, but not insurmountable. The military contracting officer must try to comply with the applicable regulations, while modifying them to meet local customs and situations. All contracts must be written and incorporate the applicable clauses and provisions which pertain to the type of contract. Unfortunately, most local vendors do not recognize written documents or do not understand English well enough to comprehend the meaning of the clauses and provisions. Although the documents can be translated into local language, this support may not be readily available or the translator is not technically proficient enough to translate the document where both versions have the same meaning.

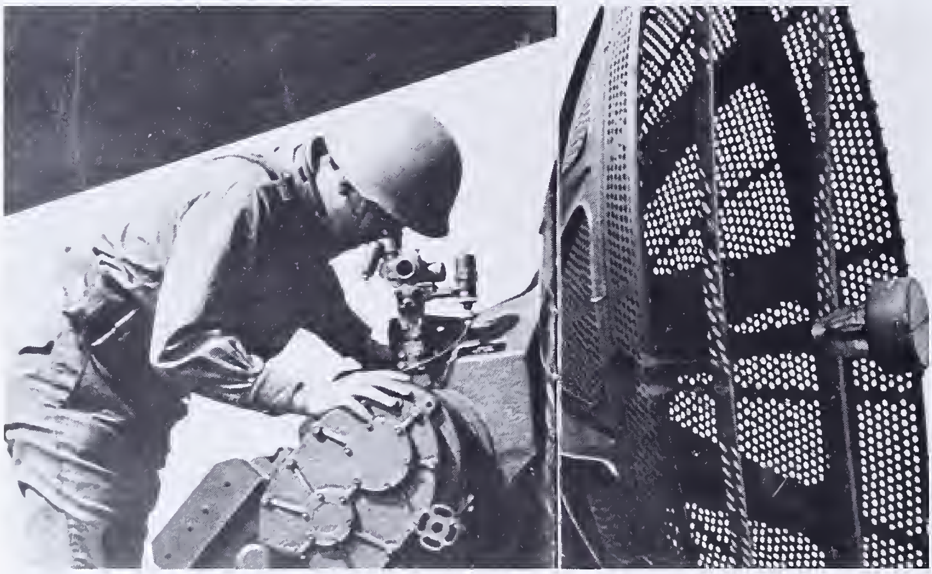
One of the contract provisions provides the caveat that in case of differences between the translated and English versions, the English version will have precedence. But in a country where no formal agreement exists between the United States the foreign government specifying the relationship between the country's laws and business procedures with ours, it is not reasonable to assume that this provision or any provision will be mutually binding on the parties to the contract.

This is when the contracting officer must temper the rigidity of the FAR, DFAR, and AFAR with the flexibility of sound judgement and common sense. It is not enough to assume what is written in these regulations is gospel and accepted world-wide. This is a dangerous assumption for an American, civilian or military, to make. American laws, customs, and procedures are binding on the people and governments of other countries only to the extent that they choose to be bound. The contracting officer must work with the local vendors or governments to reach a contract that is agreeable to both parties and provides the needed goods and services where and when they are needed. However, to do this, the contracting officer may have to modify the wording of various provisions and clauses, something which he is not empowered to do. But when the approving authority is thousands of miles away, and goods or services are needed now, a decision has to be made. In the final analysis, the contracting officer must obtain the needed goods an services at a fair and reasonable price, in a manner which is legal, agreeable to both parties, and does not give one an unfair advantage over the other.

In short, the military contracting officer must be a unique combination of combat soldier, contracting officer, goodwill ambassador, and legal clerk.

The preceding article was authored by MAJ Andrew L. Johnson Jr., chief, Procurement Branch, Office, Assistant Chief of Staff, Materiel, 1st Corps Support Command, and CPT(P) William F. Almas, contracting officer, Office, Assistant Chief of Staff, Materiel, 1st Corps Support Command.

Helix D Helicopter



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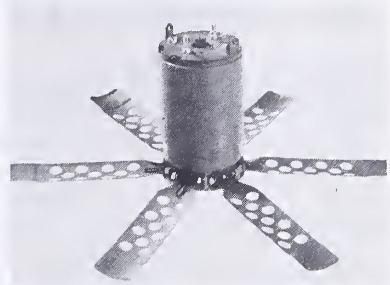
Decontaminating a tank with DKV Apparatus



Scatterable Anti-Personnel Mine

TMS-65 Decontaminating Tank (With Blower)

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Main Battle Tank M 1981/83

Operations Research Symposium Draws 300

More than 300 civilian and military personnel assembled late last year at the U.S. Army Logistics Management Center, Fort Lee, VA, for the 24th Annual U.S. Army Operations Research Symposium (AORS). Representatives from the United States, Germany, Canada, Netherlands and the United Kingdom attended the two-day event.

For the 12th consecutive year the symposium was co-hosted by the U.S. Army Logistics Center, the U.S. Army Quartermaster Center and Fort Lee and the U.S. Army Logistics Management Center. The U.S. Army Training and Doctrine Command, and the U.S. Army TRADOC Systems Analysis Activity (TRASANA) sponsored and organized the meeting.

According to LTC Kenneth R. Breeden, symposium chairman from TRASANA, the purpose of the AORS is to "share ideas and any kind of innovations on new techniques in applying analysis" with the Army's operations research/systems analysis (ORSA) community.

Present and future goals, programs, achievements and problems were discussed in two general sessions in support of the symposium theme, "Army Analysis of the Future."

Leon F. Goode, director of TRASANA, called the meeting to order and welcomed attendees. Following Goode's remarks, the first general session got underway with LTG Max W. Noah, comptroller of the Army, delivering the keynote address.

Noah commented on the high quality of today's Army and said that currently the Army "is on a high." "We have superb people and a good recruiting plan. We feel good," he added. "Right now the Army is looking good."

Focusing his discussion on the ORSA community and this year's theme, Noah compared analysis from 1965 to the present, noting that the Army started to broaden out in analysis in the 1970s. He added that an immediate look to the future would project the Army to come out of the decade with "double-digit growth."

Noah reminded analysts that there is an art to analysis. "You practice it. It is not a crank-turning machine," he said, adding that analysts are producing analyses to keep leaders informed. "You are not producing analyses just for yourself. You have to match it to what your leader wants," he said.

MG John W. Woodmansee Jr., assistant deputy chief of staff for operations and plans, force development, led the second general session.

In support of the AORS theme, Woodmansee devoted most of his discussion to the "ordeal of change" and how the Army and ORSA community should adapt to change. He admitted that change is tough and "hard to come by."

(continued on Page 26)

Army Systems Analysis Awards

One of the key features at the 24th Army Operations Research Symposium was the presentation of the Army Systems Analysis Award. Civilian and military personnel are eligible for the award, which is generally presented to an individual and a group for exceptional performance in operations research/systems analysis activities throughout the year.

According to Walter W. Hollis, deputy under secretary of the Army for operations research, 16 nominations were submitted for awards. Hollis added that for the first time since the awards have been given, the reviewing committee found "that the call was so close they created a category of honorable mention."

The 1985 individual award was presented to MAJ William R. Aldridge of the U.S. Army Combined Arms Operations Research Activity. He was commended for his achievements as director of the Anti-Helicopter Study.

The group award went to 24 individuals representing four agencies for their contributions to the Why Three Radios Study. Recipients were Robert L. Bowen, Steven T. Chizmar, Henry C. Dubin, Leon F. Fox, John C. Herringshaw, Paul R. Kunselman, Patrick J. O'Neill, Arend H. Reid, Suzanne R. Stratton, Karen A. Wilson and Arif R. Zaky of the U.S. Army Materiel Systems Analysis Activity; Cary Fishman, Joseph Hill, Albert Kerecman, John Slechta and Jack Zavin of the U.S. Army Communications and Electronics Command; William Barr, Joseph Nowak and William Stirrat of the U.S. Army Electronics R&D Command (now LABCOM); and Dick Brown, Rodney Cushing, Bruce Eisentrout, Wayne Manning and Wayne Stram of the U.S. Army Training and Doctrine Command.

Honorable mention awards in the individual category were presented to Paul D. Formby, Anniston Army Depot, and Lyle E. Starr, Office of the Deputy Chief of Staff for Research, Development and Acquisition, Department of the Army.

Formby was recognized for his achievements as project officer for the Dynamic System to Optimize Parts Supply Study, while Starr was commended for his analysis of the Army Conventional Ammunition Program.

Two honorable mention group awards were also presented this year. Joseph G. McCoy, Robert H. Priest and Dale A. Lyall of the Information Systems Command were recognized for their participation in the comparative cost analysis study of the Federal Telecommunications System and the Wide Area Telephone Service. The judging panel noted that this was a "well-founded and innovative comparison that is leading to major cost savings."

Nine employees from the U.S. Army Logistics Center were also the recipients of an honorable mention group award for their support of the Automated Support System for Army Unit Logistics Training project. The reviewing committee described the project as a "pioneering effort with considerable potential pay-off for simulation and training in the logistics area."

Recipients of this award were Ronald R. Recher, James R. Behne, Ann M. Campbell, James W. Anderson, Frank A. Lawrence, Alfred D. Damour, Lynn A. Lentz, Laurence T. Byam and Wayne A. Seeley.

Digital Topographic Support System

By Sandra J. Cleva

Last October, a team of soldiers and scientists in Ansbach, West Germany prepared some 600 terrain analysis products for the 1st Armored Division. It took them only 12 days. These Army terrain analysts and lab researchers were conducting the first demonstration of automated terrain analysis equipment developed by the U.S. Army Engineer Topographic Laboratories (ETL) as part of the Corps of Engineers' AirLand Battlefield Environment thrust.

Scientists at ETL have long stressed the Army's need for such equipment. But even they were surprised at the number of requests for support submitted by the division—and at the speed with which the demonstration team met those demands.

Terrain analysis in the field today is a manual operation. Slide rules and calculators are about the most sophisticated pieces of equipment used. Producing a single tactical overlay can take hours of work.

A terrain team commander who participated in the October demonstration pointed out just how much difference computers make. He estimated that, using manual techniques, it would take him three days to prepare a single product like the ones he had helped generate in the hundreds. An analyst would need almost five years to match the demonstration output.

Twelve days versus five years is quite a difference. ETL and the U.S. Army Troop Support Command are working to give commanders the edge implied by that statistic. The Digital Topographic Support System (DTSS), now ready for engineering development, will put the speed and flexibility of automation to work for the Army's terrain analysts.

Key Combat Support

Commanders need to know as much as possible about the battlefield if they are to control the action upon it. Elevation, slope, vegetation, soils, drainage, waterways, roads, railroads, urban areas and other terrain factors must be taken into account in planning and carrying out combat maneuvers.

The terrain affects almost every tactical decision made on the battlefield. Commanders, however, aren't alone in their need for terrain information. Many of the Army's new automated weapon and intelligence systems also use terrain data.

DTSS will support both of these groups. Scheduled for fielding in 1991, this sophisticated terrain data management system will give engineer terrain teams an automated capability for storing, creating, updating and processing digital topographic data. DTSS will provide commanders the analytical products they need to map out their battle plans. It will also keep a variety of automated battlefield systems supplied with digital topographic data.

Analytical Capabilities

DTSS will replace the manual methods now used to gather and analyze terrain information. The soldiers who man the new system will work with digital terrain data bases provided by the Defense Mapping Agency and interactive computer programs. They'll generate complex terrain graphics to support tactical planning and decision making.

ETL scientists have already developed most of the software needed to make DTSS an invaluable terrain analysis tool. These programs combine information on the Army's weapons, sensors, vehicles and communication equipment with terrain elevation and feature data. They predict how the battlefield will affect the machines, materiel and maneuvers used in combat.

DTSS analytical programs deal primarily with questions of intervisibility and mobility. The resulting terrain products will tell commanders what they—and the enemy—can see and where they can go.

Intervisibility models, for example, determine areas that are visible, either electronically or optically, from a given site. These programs compensate for the curvature of the earth and atmospheric refraction. They rely primarily on terrain elevation data, although users have the option of including vegetation heights in the analysis. Intervisibility models include target acquisition analyses, masked area plots and perspective views.

Target acquisition analyses determine where incoming targets first become visible to an observer or sensor. Users can generate sighting contours for single or multiple altitudes; they can instruct the computer to prepare this information for observer sectors from zero to 360 degrees. The resulting graphics can help commanders select the best positions for radar units and other electronic surveillance equipment.

Masked area plots give commanders valuable line-of-sight information. These graphics shade in those areas radiating out from a selected site where ground targets will be shielded from view. They take into account "masking" provided by vegetation as well as elevational changes.

A third type of intervisibility product lets commanders see the terrain in full perspective. Perspective views use a grid of equally spaced lines to follow the changing elevations of the terrain; those portions which would be hidden by hills and other features are removed. The resulting "fishnet" model of the terrain gives the illusion of depth to the scene. These products make it easier for users to envision how the terrain actually looks from a particular vantage point.

Intervisibility products also include terrain profile plots, multi-site and composite target acquisition determinations, path loss/line-of-sight analyses, flight line masking graphics, minimum detection altitude computations, and oblique projections. With this type of information, commanders can identify the best location for weapon systems, communications facilities, short-range radar and other battlefield sensors whose performance will be affected by their position vis-a-vis the terrain.

The second major category of DTSS analytical programs manipulate digital feature data. Mobility products can help commanders move and maneuver their men and equipment. These programs address operations in the air as well as on the ground. They deal with such concerns as cross-country movement, helicopter landing areas, drop zones and concealment.

Cross-country movement analyses calculate the off-road speed capabilities for Army vehicles. This program compares the climb capabilities of the particular vehicle with slope data,

evaluates its override capabilities in terms of such vegetation factors as stem spacing and diameter, and considers its response to the soil types and moisture found in the area. Seasonal information can also be incorporated into the analysis.

The helicopter landing area and drop zone models also work with slope, vegetation and soil data. The resulting products show commanders where helicopters can best land and identify potential paradrop sites for men, equipment and supplies.

Concealment calculations focus on the amount of protection provided by the vegetation. Graphics depict concealment for troops and equipment in terms of the extent to which they risk detection by aerial reconnaissance.

DTSS mobility programs provide data that can be used to plan a variety of other military operations. The system, for example, will produce information on river crossing sites, lines-of-communication, air avenues of approach, infiltration routes, key terrain features and local relief.

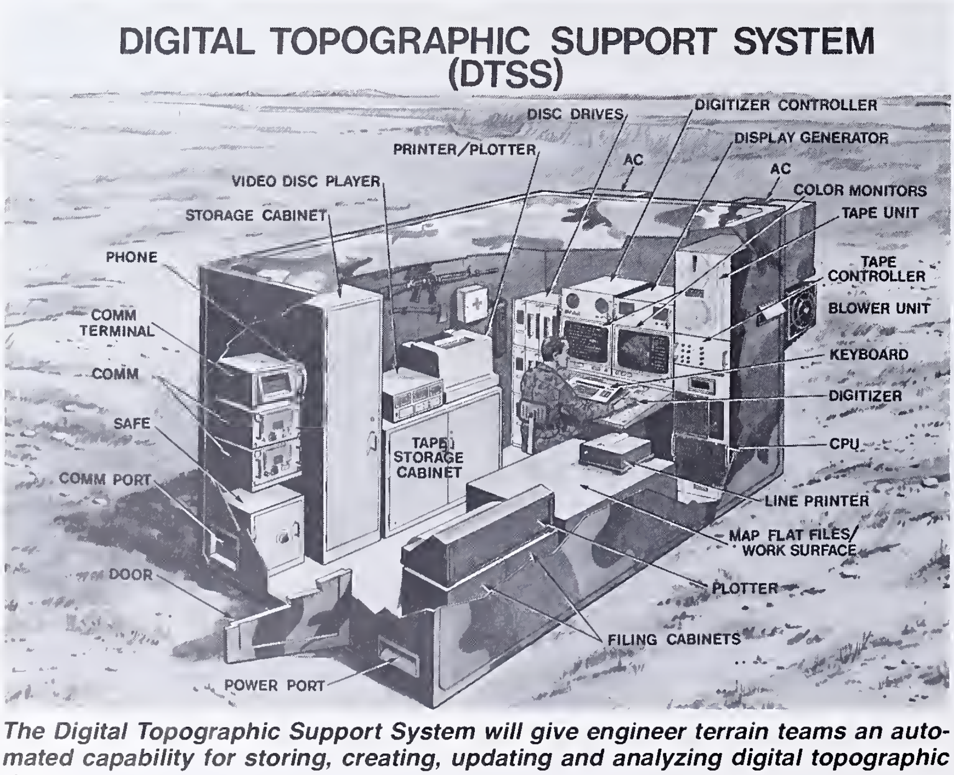
Advantages of Automation

Today commanders get this type of information from terrain analysts who manually assemble and analyze the required data—a slow tedious process at best. For example, if an analyst has to prepare a cross-country mobility graphic for a tank, he must first obtain (or create) individual factor maps depicting the slope, soil and vegetation present in the desired area of operation. He visually correlates these maps, applying a complex analytical model which considers both the tank's capabilities and the combined effects of the terrain. He then drafts an overlay showing the speeds at which the vehicle can travel in the areas being considered. The accuracy of the final product will depend not only on the accuracy of the source materials used, but on the skill, experience and execution of the analyst.

By automating these tasks, DTSS will generate the same graphic in a fraction of the time. The products generated, of course, will only be as accurate as the data on which they're based. Using computers to generate these products, however, eliminates human error as a potential source of distortion.

Automation provides flexibility as well as speed and accuracy. The terrain analyst in the example above would have to repeat much of his labor if he were told to produce a similar map for a different vehicle or at a different map scale. With DTSS, the operator will enter in the characteristics of the new vehicle or different map scale; the system will revise the output product accordingly.

When DTSS reaches the field, terrain teams will have access to more than 20 different terrain analysis programs. They'll also be able to evaluate how a variety of other environmental factors will impact on military operations. DTSS environmental effects programs, for example, will provide information on climate statistics, surface winds, density altitudes, paradrop conditions, standard atmosphere measures and aircraft altimeter settings.



The Digital Topographic Support System will give engineer terrain teams an automated capability for storing, creating, updating and analyzing digital topographic data.

Fielding Plans

The first DTSS units will give terrain analysts access to these extensive software capabilities. Initial hardware components will include a processor, disk drives, large-scale plotter, line printer, and interactive graphic workstations. An S-280 shelter mounted on a 5-ton truck will house the system.

The Army plans to field DTSS in phases; an initial capability will be followed by an extensive Pre-Planned Product Improvement (P3I) program. The software and hardware described above will provide an initial capability to engineer terrain teams at corps and division levels. These DTSS units will be collocated with the All-Source Analysis System (ASAS)—an automated intelligence system being developed by the Joint Tactical Fusion Program Management Office (JTFPMO).

ASAS is intended to improve the Army's intelligence analysis and electronic warfare capabilities. Topographic products generated by DTSS will support such ASAS functions as intelligence preparation of the battlefield and sensor management.

Linkage with ASAS requires careful coordination between system developers. A Memorandum of Understanding between ETL and JTFPMO laid the groundwork for ensuring system compatibility. DTSS, for example, will use the same militarized/ruggedized hardware that's being developed for ASAS. The two systems will feature similar equipment support and maintenance requirements and similar reconnaissance signatures.

The need to ensure DTSS/ASAS compatibility has helped ETL streamline the DTSS acquisition process and eliminate some of the risks involved in preparing the system for the field. Using ASAS hardware components will expedite DTSS developmental work. Because ETL has already prepared most of the software needed to make DTSS an operational terrain intelligence system, the engineering development effort will focus on converting existing programs to run on the computers selected for use in the field.

Pre-Planned Product Improvements

The DTSS acquisition strategy in-

cludes an extensive (P3I) effort. This effort will expand the system so that it can support other Army users of digital topographic data.

In addition, the P3I program will allow terrain teams in the field to take natural and man-made changes in terrain features into account. The upgraded DTSS will give Army topographic battalions expanded terrain data manipulation capabilities. Soldiers will be able to update, revise and intensify DMA data bases. They'll also be able to generate special data sets in response to needs identified by commanders and other tactical users.

ETL scientists are already working on this aspect of the P3I program. They have assembled a Terrain Analyst Work Station (TAWS) to facilitate the development of the data base creation and manipulation capabilities needed for the upgraded DTSS. This laboratory system also includes many of the analytical capabilities that will be fielded in the baseline DTSS.

Three basic instruments will allow TAWS users to build and update terrain data bases. An x-y digitizing table already provides an initial data base creation capability. With this equipment, users can digitize existing terrain analysis products such as the hard copy Tactical and Planning Terrain Analysis Data Bases produced by the Defense Mapping Agency. The addition of a specially designed light table mensuration system and an analytical stereoplotter with superpositioning capabilities will expand the TAWS data base creation capacity, allowing analysts to take advantage of photographic source materials.

With the light table mensuration system, for example, operators will be able to extract feature data and make measurements from aerial imagery. They'll use the analytical stereoplotter to produce elevation data from stereo imagery and make three-dimensional measurements of terrain features. The inclusion of superpositioning capabilities means that analysts will be able to "playback" the information they've digitized in the working stereo model. They can spot errors quickly and correct them. They'll also be able to check and edit existing data files by comparing stored information with new photographs.

Demonstration Program

ETL scientists are using TAWS to conduct a series of garrison and field demonstrations—a series which began last October in Ansbach. During that demonstration (which was described briefly at the beginning of this article), researchers taught terrain team members from the 518th and 526th Engineer Detachments how to use TAWS. After the terrain analysts mastered the equipment, they used it to generate products requested by 1st Armored Division officials. Feedback obtained from the soldiers will help ETL scientists improve the system's software design and make TAWS (and DTSS) more user-friendly.

A second demonstration was completed in February at Fort Bragg, NC. Officials followed the same "training-production-feedback" pattern. Scientists showed terrain analysts from the 283d Engineer Detachment how to operate the system. The soldiers then used TAWS to provide terrain analysis support to the XVIII Airborne Corps during the Gallant Knight training exercise.

ETL scientists plan to conduct similar demonstrations with other units. One purpose behind these demonstrations is to introduce Army terrain teams to the digital terrain analysis capabilities and computer-based equipment that they'll use in the future. Feedback from these exercises will help ETL scientists validate and refine the terrain data management techniques and methodologies planned for DTSS, particularly those scheduled for fielding under the P3I program. In line with this goal, future TAWS demonstrations will focus more extensively on evaluating the system's data base creation and revision capabilities.

The Analytical Edge

Although the major thrust of the P3I program will be to give topographic units the tools and techniques needed to build and update terrain data bases, scientists also plan to upgrade the system's analytical capabilities.

Program officials intend to take advantage of sophisticated environmental analysis capabilities that are now under development at various Army laboratories. Much of the research being conducted under the Corps of Engineers' AirLand Battlefield Environment (ALBE) thrust, for example, may ultimately pay off in improvements for DTSS—and for the Army commanders served by the system.

DTSS will be the first field system to benefit from this cooperative research program. The Corps and Army Materiel Command laboratories participating in the ALBE thrust are working on a variety of environmental analysis programs—programs designed to help commanders measure, monitor and manipulate the battlefield environment.

ETL scientists and ALBE officials believe that many of these programs promise expanded analytical capabilities for DTSS. One set of ALBE programs, for example, maps out the hazardous areas that would result from the enemy's use of nuclear weapons or chemical warfare. Other programs assess the impact of the environment on the tactical use of smoke and evaluate the effect of the terrain on such countermobility operations as minefield placement.

Future Efforts

Upgrades for DTSS should begin to reach the field in the mid-1990s. ETL scientists, however, don't expect their work on the project to end then.

DTSS represents the beginning of a long-range effort to give the Army quick, comprehensive topographic support. Researchers see the system evolving over time—taking advantage of new software and hardware components as they emerge from the laboratory.

ETL scientists are already conducting studies that may provide expanded capabilities and increased speed and efficiency for DTSS. Investigations involving automated feature extraction, for example, may result in computer programs that can help analysts extract information from aerial photos—information which could be used to create or revise terrain data bases.

Scientists are also exploring the tactical applications of computer image generation. This advanced computer graphics technology uses digital data bases, imagery sources and sophisticated processing techniques to produce realistic terrain scenes. Such scenes could help commanders study their area of operation and plan their course of action.

By the beginning of the next decade, commanders will have access to accurate, timely terrain analysis support. DTSS will provide crucial data for advanced weapons and intelligence systems as well as vital information for command and control. The ongoing incorporation of new technologies will give the Army improved topographic support for the 1990s—and beyond.

SANDRA J. CLEVA was a public affairs specialist at the U.S. Army Engineer Topographic Laboratories, Fort Belvoir, VA, when she wrote this article. She now works for the Department of the Interior's Bureau of Mines. She holds M.A. and B.A. degrees in English from the University of Virginia.

Changes to AR 70-1

One of the highest priority initiatives of the Army Materiel Command (AMC) is to shorten the materiel acquisition cycle. Fielding equipment for the soldier has taken too long in the past. AMC and the Army Training and Doctrine Command (TRADOC) recognize this situation and have jointly initiated action to streamline the process. AMC's streamlined acquisition process is being adopted Army-wide through a complete rewrite of Army Regulation 70-1 (Systems Acquisition Policy and Procedure). As a concurrent action, TRADOC has also rewritten the counterpart regulation, (AR-71-9), which covers the policies and procedures for documenting and processing materiel objectives and requirements. This revised regulation stresses the need to expedite the materiel requirements process. Army senior leadership agreement has been reached as to the basic purpose, scope and direction of these two regulations. Although some additional administrative effort will be necessary to finalize these regulations, the goal is to have both regulations approved and released by May 1986.

Addition of ASAP

A section has been added to AR 70-1 which describes the new Army streamlined acquisition process (ASAP) as the accepted method to achieve acquisition streamlining. This section provides a description of key features of ASAP, followed by a discussion of each phase of the process (i.e., Requirements/Tech Base, Proof of Principle, Development/Prove-out and Production-Deployment). The ASAP approach provides license for tailoring without requiring case-by-case exceptions. Once a program has been designated an ASAP candidate and the acquisition strategy has been approved, it can proceed without further approval of specific deviations. Key features of ASAP include:

- requirements are structured for pursuit of companion "now" and "later" capabilities or parameters which foster low risk development for the near term with commensurate visibility and priority for parallel growth capability under the Preplanned Product (P3I) concept;
- early focus of technology on mission area needs and the maturation of technology at component level. This is accomplished through the Technology Integration Steering Committee (TISC), which pairs technological opportunities with emerging requirements;
- combination of appropriate elements of Concept Exploration and Demonstration-Validation Phases into a scaled-down Proof-of-Principle approach, featuring user experimentation or troop demonstration of brassboard systems, components or surrogates to prove out both the technical approach and operational concept before proceeding to full scale development;
- solid prove out of production—including hard-tooled prototypes whenever possible—along with manpower and personnel integration (MANPRINT) and Integrated Logistics Support prior to entry into the Production-Deployment Phase;
- integrated Technical Test/Operational Test approach via the Master Evaluation Plan, wider sharing of test data via a common test data base, and continuous evaluation throughout the life cycle;
- reorientation of formal milestones: program initiation via Operational and Organizational (O&O) Plan or Justification for Major System New Start (JMSNS) approval; entry into Proof of Principle based on TISC findings and supported by a combat developer/materiel developer review of program management documentation; collapsed Milestone I/II for entry into the Development/Prove Out phase, constituting a "go/no go" commitment to the program; and Milestone III for entry into the Production-Deployment phase.

Other Significant Changes

The Army level In-Process Review (IPR) category has been eliminated from the Materiel Acquisition Decision Process Reviews, leaving only three program decision mechanisms (DSARC, ASARC and MACOM IPR).

Letter Requirements and Letters of Agreement have also been eliminated, leaving the O&O Plan or JMSNS and the Required Operational Capability (ROC) as the only requirements documents. The O&O Plan will contain operational/performance characteristics from the outset, which will eliminate the need to update the requirement document. In addition, ASAP eliminates revalidation of the ROC before a production decision because the final "go/no go" decision is made before entry into Development/Prove Out.

Summary

The new regulation places emphasis on the low end of the acquisition spectrum in devising materiel alternatives to meet a mission area deficiency. Specifically, the first consideration must be given to satisfying the materiel requirement by applying a product improvement (PIP) to existing equipment and, if that is not satisfactory, then to acquire the required materiel through the Nondevelopment Item (NDI) procedure, which is a recognized and accepted acquisition strategy under the ASAP concept. Only after the determination is made that PIP or NDI will not satisfy the requirement will a new development be considered. When development alternatives must be pursued to satisfy the need, low-risk technology or systems integration should be employed, with future growth potential provided through P3I after the requisite technology has matured. The section on NDI in the regulation has also been updated to reflect current thinking within the Army.

Many challenges still face us in achieving a truly streamlined acquisition process. However, tremendous progress has been made and a consensus is growing. Increased support within the Army and the other services, as well as constructive feedback from industry, will make the difference. Together, all members of the acquisition community stand to gain from a shorter, simpler materiel acquisition process.

The preceding article was authored by Judy Fite, an acquisition policy specialist and chief of the Policy Branch, Acquisition Policy and Assessment Division, Office of the Deputy Chief of Staff for Development, Engineering and Acquisition, HQ, AMC.

TACOM Steps up Robot Vehicle Development

The RD&E Center at the U.S. Army Tank-Automotive Command (TACOM), Warren, MI, is stepping up efforts aimed at developing robotic military vehicles, and has developmental efforts on several fronts. Such vehicles would enhance troop survivability by performing high-risk battlefield tasks.

The effort is in response to DA and the Army Materiel Command directives in which TACOM and four other Army agencies were named to jointly manage the research and development of robotic vehicles. The other organizations playing management roles are the Defense Advanced Research Projects Agency, Rosslyn, VA; the Human Engineering Laboratory, Aberdeen, MD; the Engineer Topographic Laboratory (ETL), Fort Belvoir, VA; and the Army Armor Center, Fort Knox, KY.

The objective is to develop robotic systems that would use artificial intelligence (AI) to increase the combat and force effectiveness on the battlefield. AI is any computerized model of the logic involved in solving problems. When programmed into a computer-controlled system, such a model enables that system to imitate the human thought process which occurs before making a decision.

TACOM's involvement in robotics research intensified last May when the command and the Jet Propulsion Laboratory (JPL), Pasadena, CA, began a project to demonstrate the feasibility of computer-aided remote driving. In this demonstration, which took place during the second quarter of the current fiscal year, the operator controlled a test-bed vehicle from a nearby building. The test bed was an articulated 6x6 rover vehicle developed earlier by JPL for use in manned planetary exploration.

JPL modified the vehicle to permit remote operation. Changes included the installation of a computerized control system and stereo cameras that were connected to the remote control site by a cable extending from the rear of the vehicle.

In operation, the cameras produced images of the scene ahead of the vehicle. These images were sent through the cable to a display at the remote control site. The operator then designated where he wanted the vehicle to go simply by moving an electronic cursor on the display to specific points in the scene. As he did this, the computer would generate the control signals needed to drive the vehicle to each designated point.

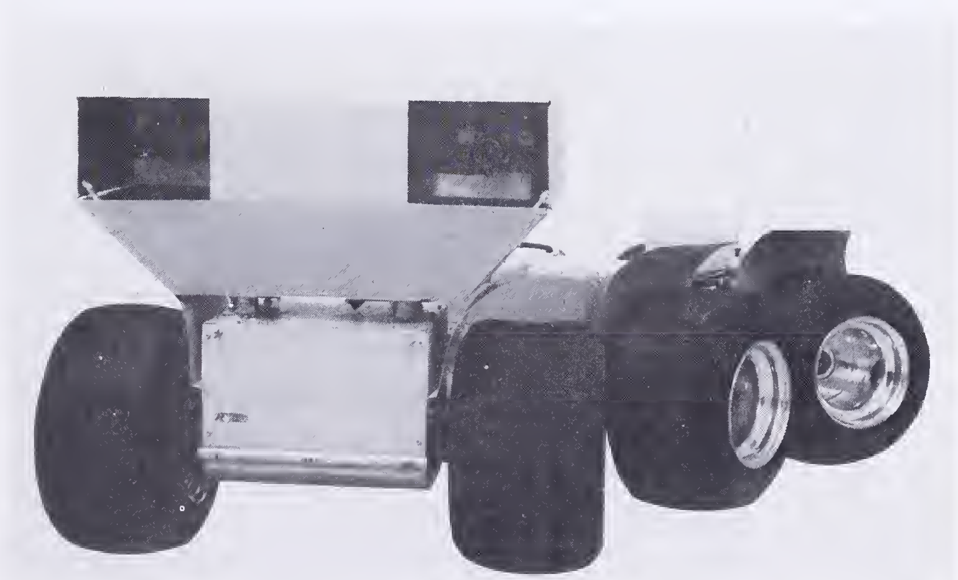
TACOM engineers see such a system as having a great potential for multiple vehicle control applications. Once the operator designates a path for a vehicle to follow, the system would take complete control of that vehicle, thus leaving him free to designate paths for other vehicles.

A second remote driving demonstration at JPL is being funded by the Army Development and Employment Agency and is planned for next fall. The test bed will be basically the same as the one in the earlier demonstration. One new feature, however, will be the addition of an interactive route-planning capability. This will be achieved by programming into the computer an electronic map and a digital terrain data base of the demonstration area, which is now being developed by ETL.

In addition to the JPL projects, TACOM has "leveraged" industry independent research and development through contracts with General Dynamics and FMC Corp. calling for feasibility demonstrations of a robotic vehicle concept proposed by each firm. Unlike the JPL test bed, these vehicles will each be operated from an instrumentation and control van rather than from a stationary site. Also, they will be radio-controlled and thus have no cables linking them to their vans. The General Dynamics concept is a Cadillac Gage-built 4x4 commando scout, while FMC is using an M113-series armored personnel carrier.

Both vehicles will have integrated autonomous road-following and remote-control capabilities. During on-road operation, a camera on board will view the road surface and feed the images into a computer. The computer will analyze these images to find the edges of the road, and automatically generate the appropriate driving commands needed for the vehicle to travel along the road. For off-road operation, the operator will manually control the vehicles from his remote location.

The objective of this demonstration is to show how current robotics technology can be used to perform an actual mission. A mission will be devised that will require the demonstration of both autonomous road-following and teleoperation control. It will be a route reconnaissance mission that will involve using vehicle-mounted panoramic day-night sights capable of rotating 360 degrees. As the vehicles



The articulated 6X6 Rover Vehicle, developed by Jet Propulsion Laboratory for use in manned planetary exploration, is the test-bed vehicle.

travel along a planned route, these sights will be used to make observations and feed images back to the operator, thereby allowing him to examine the route.

Last August, in other robotics efforts, TACOM awarded three Small Business Innovation Research contracts. One of these is with the KMS Fusion Co. of Ann Arbor, MI. The objective of the KMS effort is to develop enhanced AI that will mimic more of the human thought process involved in route-planning.

The second contract is with the Maryland-based Automation Technology Corp. (ATC), which is developing an improved three-dimensional vision system that can be remotely adjusted by the vehicle operator to optimize vision capability. The systems currently on the market are fixed, which means different operators could not make adjustments to meet specific needs. For example, these systems do not have controls for changing the distance between the cameras and have no zoom lens capability. At ATC, a breadboard adjustable system is being built and will be tested with four or five subjects to determine if an adjustable system would offer significant advantages over a fixed system.

The third small-business effort involves Theory and Applications Unlimited Corp., in California, which is developing an enhanced computer-generated route-planning graphics display. Normally such a display includes only a top-down view of the route. The Theory and Applications Unlimited display will be vastly different. It will provide a perspective view, so that the operator would see the route as though he were actually driving through it.

Future plans at TACOM call for the development of an advanced robotic vehicle demonstrator referred to as the Supervised Autonomy Test Bed. It will incorporate all the technology developed during the current phase of the program.

The preceding article was authored by George Taylor III, a technical writer-editor for the Army Tank-Automotive Command.

'Age Busting' Effort Upgrades Multiplexers

Thanks to a unique hardware re-engineering technique dubbed "Age Busting," the Army will be able to upgrade some 7,000 TD-660 multiplexers and save more than a million dollars a year in the process. The technique also has the potential to cut costs that discourage the redesign of other outdated electronic components for aging military systems.

The multiplexers, which are used in the field for the simultaneous transmission of signals, were designed in the early 1960s. They have obsolete circuits and require spare parts that are no longer available.

The discontinued parts problem is one that plagues all long-lived military systems. To go back to the original contractor and ask him to upgrade or redesign a 20-year-old system is prohibitively expensive. Yet, that step is usually necessary because of the original contractor's proprietary rights to the design.

In the case of the multiplexer, the challenge was met through a cooperative effort involving the U.S. Army Laboratory Command (LABCOM), the Communications-Electronics Command and AT&T Technologies.

Engineers from LABCOM's Electronics Technology and Devices Laboratory (ETDL) at Fort Monmouth, NJ, were able to re-engineer the multiplexer's hardware by developing a special computer language. Based on the Army's Ada-computer language, it is called the Very High Speed Integrated Circuitry (VHSIC) Hardware Description Language. ETDL is the Army lead laboratory for the Department of Defense VHSIC program.

Really a software tool, this language is used to describe the form, fit, and function of an electronic system. With this language, engineers were able to capture and document the existing design and potential redesign of the multiplexer's obsolete circuits.

Because data on the design can be captured independently of the technology that produced it, the resulting documentation allows the government to construct their own "original" design, thereby avoiding infringement of proprietary contractor technical data and allowing competitive procurement based on the new redesign.

Randy Reitmeyer, chief of the ETDL Microelectronics Division, explains the significance of the documentation: "The methodology once and for all breaks the tie between the design of a system to the manufacturer. The update or redesign of a system does not necessarily have to be done by the original contractor, therefore allowing greater competition and associated lower costs. Proper documentation allows the government to bring the upgrading problem to numerous contractors and be able to choose the least expensive from many low-cost proposals."

The re-engineering work on the TD-660 multiplexer has replaced 10 heavily populated printed circuit boards with six moderately populated and four blank boards. In the process of replacing obsolete parts, power consumption was cut by a third.

The re-engineering effort has produced a complete documentation of the system in computer-readable language—from the system level down to a detailed chip level. Future upgrades can be made easily and economically.

The improved multiplexer is now twice as dependable as it was before, 60 percent of manual equipment adjustments were eliminated, and enhanced maintainability and performance extended its life cycle by 10 years. The field upgrades will save $1.10 million a year.

ETDL engineers have dubbed their re-engineering program Age Busting because the process gives new life to old equipment by re-engineering hardware with a hardware description language. It also reduces the life-cycle cost of these systems. Finally, Age Busting answers an Army-wide challenge to bring in microelectronics technology insertion items with short-term cost pay-backs.

BRL Studies Liquid Propellants

The Army Ballistic Research Laboratory (BRL), Aberdeen Proving Ground, MD, is conducting research into liquid propellants for Army tank and artillery ammunition. Liquid propellants may save the Army billions of dollars and lead to a revolution in armored vehicle design, ammunition handling logistics and combat crew safety.

According to Dr. Ingo May, chief of BRL's Advanced Ballistic Concepts Branch, and Dr. Walter F. Morrison, deputy branch chief and program manager for the liquid propellants program, Army studies of liquid propellants began in the late 1940s.

Army researchers studied two systems using liquid propellants, May said. The first, termed bulk-loaded, simply involves injecting a specified amount of propellant into a gun chamber and igniting it. This system proved to be impractical in systems where repeatability is important; chamber pressures and muzzle velocities of the projectiles varied significantly due to hydrodynamic instabilities. Bulk-loaded liquid propellant guns currently are thought to have little potential for development, except perhaps as air defense cannons or small caliber weapons.

The second system, termed regenerative injection, involves using a piston to force the liquid propellant, in the form of a jet or spray, into the gun chamber during the combustion process thereby controlling propellant combustion. With this system, the liquid propellant can be metered accurately and repeatable pressures and muzzle velocities can be achieved.

Exploration of both systems was accelerated as a result of the Korean War and, by the mid-1950s, the Army was exploring the design of a tank gun based on a liquid propellant concept. The level of technology, however, was lacking in the 1950s and the program was sidelined.

During the late 1970s and into this decade, interest has revived in the regenerative ignition liquid propellant system. For the first time, technological advances offer ways to successfully adapt liquid propellants to Army tanks and artillery pieces. In addition, advances in anti-armor weapons and counter-artillery systems necessitate making our tanks and artillery less vulnerable.

According to May and Morrison, adoption of liquid propellants for these weapons systems would enable designers to develop new tanks and artillery systems that are smaller, faster, and less vulnerable to enemy threats.

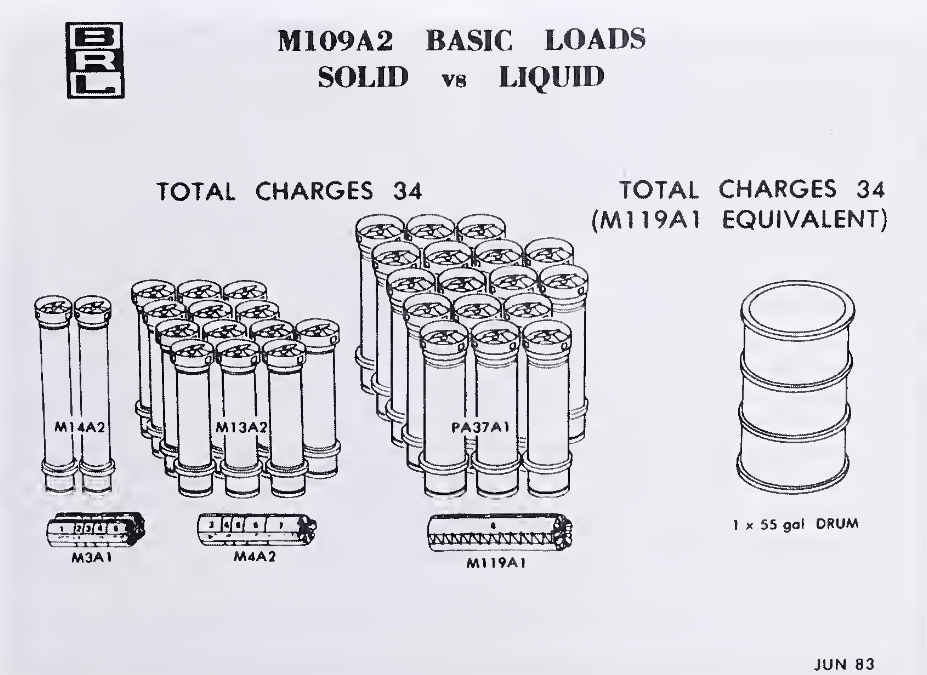
"Liquid propellants have a high density," May said. "It is possible to pack more energy into a smaller volume. Typically, solid propellants have a one gram per cubic centimeter packing density, whereas liquid propellants have a packing density on the order of 1.4 grams per cubic centimeters."

The researchers used the M109A2 howitzer as an example. Using current solid propellants, the M109A2 can carry about 34 propellant charges for its projectiles. Each charge is carried in an individual canister which can weigh as much as the propellant it contains. The 34 canisters occupy much of the vehicle interior. An additional crewman is needed to handle the charges when loading the 155mm cannon in the M109A2. The vehicle's crew ride in the same compartment as the propellant.

With solid propellants, the charges are packed in bags, with varying charge levels. For short-range firing missions, a portion of the solid propellant in the canister must be discarded. This wasted propellant then must be disposed of after the gun crew completes its assignment.

"Using liquid propellants," Morrison said, "eliminates these problems. The equivalent of 34 maximum (Zone 8) charges can be carried in the form of a single 55-gallon drum of liquid propellant. Since the propellant is a liquid, it can be stored outside of the crew compartment, with a hose connecting the drum to the artillery piece. Only the amount of liquid needed for a particular range is used, thereby eliminating the waste found with solid propellants. Since the liquid can be pumped into the gun chamber automatically, the need for an extra crewman to handle the propellant is eliminated." Ignitable readily at gun chamber operating pressures, liquid propellants are difficult to ignite at ambient pressures. Their use in combat vehicle munitions should minimize vehicle loss from projectile and spall impact initiation of stowed solid propellants.

"An additional benefit involves transportation of the chemicals," said May. "Transportation of solid propellants is strictly governed both in the United States and abroad. Many bridges and



tunnels cannot be used, and transportation routes must be selected to avoid highly populated areas." Such restrictions likely will not apply to less hazardous liquid propellants, thereby reducing transportation costs while expediting materiel delivery.

"It is also conceivable," Morrison said, "that the two chemicals that comprise the liquid propellant—triethanol ammonium nitrate and hydroxyl ammonium nitrate—can be packaged separately and not mixed to form the propellant until they reach a port. Separately, the two chemicals are not propellants.

"Since the components of the liquid propellants are not propellants by themselves, they can be transported much more freely and with far greater safety," he said. "Once the chemicals arrive at their storage depot, they can be kept in complete safety for an indefinite period. As the need arises, the chemicals can be mixed to fill orders from the field for propellant, or they could possibly be shipped separately to units in combat and not mixed until actually needed for a fire-support mission."

Vehicle vulnerability on the battlefield is a major concern. Studies of vehicles destroyed in the 1973 fighting in the Middle East show most of the vehicles were destroyed when the enemy anti-armor munition's impact triggered a secondary explosion of the ammunition carried in the vehicle. If the vulnerability of on-board ammunition is eliminated, the systems analysts feel many tanks and other armored vehicles hit by enemy weapons can be repaired and returned to action.

Lives of crewmen also can be saved. If the on-board ammunition explodes, few of the vehicle personnel usually survive. If an anti-armor round should penetrate a vehicle carrying liquid propellants, only those soldiers caught in the spall cone of fragments from the anti-armor weapon should be injured. "What this means for the Army of the future is combat vehicles can be designed that are smaller, since the propellant requires less storage space and fewer crewmen are required to handle it; lighter, since armor can be concentrated to protect the crew, ignoring the ammunition storage area; faster, since the lighter weight of the vehicle can be propelled with less demand on the engine's available horsepower; and safer, since the occupants are not exposed to the possibility of secondary explosion of on-board stores," May said.

"Other advantages of liquid propellant systems include the fact that the system can be retrofitted to existing combat vehicles, thereby enhancing their survivability," May added.

Liquid propellants also would reduce cost. A standard packaged artillery charge costs about $10 per round of propellant. An equivalent amount of liquid propellant costs about one dollar. Additionally, the raw materials used in the production of liquid propellants are available commercially. The cost of liquid propellant production facilities will be much lower than comparable solid propellant facilities since only commercially available processing equipment is required. BRL studies comparing production costs of solid propellant with liquid propellant from October 1982 through September 1989 indicate adoption of liquid propellants could save the Army more than $1.25 billion. These figures are based on peacetime production rates.

In wartime, if ammunition demands reach levels projected by the Army, the potential saving from using liquid propellants would be enormous. Basing their study on 155mm ammunition alone, the researchers showed that monthly savings of about $200 million are possible.

A real concern for artillery and tank crews is associated with blast-pressures outside the tank or near the cannon. Liquid propellants reduce the blast over-pressures caused by re-ignition of muzzle gases.

Current solid propellants produce carbon monoxide, hydrogen, carbon dioxide, water, and nitrogen oxides at the muzzle. Several of these gases are toxic, and carbon monoxide and hydrogen can re-ignite outside the muzzle causing a secondary blast and flash. This re-ignition can enable an enemy to spot our artillery.

With liquid propellants, the only byproducts produced are almost exclusively carbon dioxide, water, and nitrogen, all of which are inert and nontoxic.

"Implementation of the liquid propellant technology is still four to five years in the future," Morrison said. "We've proven the concept using 30mm cannons. The prime gun contractor, General Electric, has independently demonstrated a rate of fire of about 500 rounds per minute in a 30mm cannon. We want to scale this technology, but not this rate of fire, of course, to 155mm caliber next. We also need to continue research into establishing the 'shelf life' of the propellant (proving that it doesn't deteriorate over time), ensuring that the properties of the propellant remain acceptable as a result of temperature fluctuations, and demonstrating that the propellant is safe to handle under all conditions troops might encounter in the field."

"We also want time to engineer out any 'bugs' that always arise in new systems, and ensure that a realistic goal of 3,000 rounds before major repair of the gun can be achieved," May said.

"A final advantage to liquid propellants," Morrison said, "involves disposal, or 'demilitarization.' The simplest and most beneficial way of getting rid of waste stocks of propellant may be to dilute it with water and pour it onto any farm field. Our chemists tell us the propellant is an excellent fertilizer!"

Symposium—continued from page 18

He spoke favorably of the AirLand Battle concept, noting that it "makes an immense amount of sense." He also recommended that the ORSA community working with this concept rationalize it, making it easier to understand.

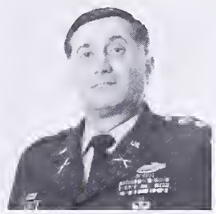
In conclusion, Woodmansee suggested that in order to more effectively deal with the ordeal of change, analysts should become better organized to narrow available choices. He recommended that routine functions be automated and facilities designed so that decisions can be made that will hold up better over time.

In addition to the general sessions, seven special sessions were featured where 90 technical papers covering a wide range of subjects were presented.

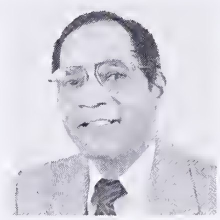
Titles and chairman of the special sessions were: Force Design and Analysis, LTC Jim Pittman, U.S. Army Combined Arms Operations Research Activity; Command, Control, Communications, Computers and Intelligence, Gale Mathiasen, TRASANA; Manpower and Training, Thomas L. Paris, TRASANA; Sustainability and Support to the Forces in the Field, Tom Edwards, U.S. Army Logistics Center; Testing and Field Exercises, Stephen French, U.S. Army Operational Test and Evaluation Agency; Systems Effectiveness and Survivability, John Kramar, U.S. Army Materiel Systems Analysis Activity; and Recent Advances and Future Trends in Operations Research Methodology, Jerry Cooper, U.S. Army Concepts Analysis Agency.

Who's Who in RD&A Personnel Management

Proponency Managers



LTC Edward L. Oliver III
Skill 6T
Materiel Acq. Mgt.
HQ AMC, AV 284-5076



Hughes S. Hobson
Skill 6T
Materiel Acq. Mgt.
HQ AMC, AV 284-5076

Jo Laree Green
FA51 R&D
HQ AMC, AV 284-8537

MAJ Johnie J. Wright
FA52 Nuclear Energy
Ft. Leavenworth, KS
AV 552-2724/5183

MAJ Randy Elmore
FA97 Procurement
HQ AMC, AV 284-8125

MILPERCEN Professional Development/Assignment Officers

MAJ Richard D. Nidel
Skill 6T
Career Program
Manager
AV 221-0417

Barbara Head
Skill 6T
Management
Specialist
AV 221-0417

MAJ Ed Coughlin
FA51 Assignment
Officer
AV 221-5210

MAJ G. Dickson
Gribble
FA52 Assignment
Officer
AV 221-0628

MAJ Donnie George
FA97 Assignment
Officer
AV 221-5210

FA 51 Proponent Office Update

Revision of Regulations

Recent changes to the Officer Personnel Management System have necessitated revisions to the various Army publications governing the personnel system. These include the following:

- AR 611-101 (Commissioned Officer Classification System), which governs the coding of officer positions on authorization documents, has been published and distributed.
- DA Pamphlet 600-3 (Commissioned Officer Professional Development and Utilization) has been rewritten and reformatted. Proponent input is being reviewed and prepared for publication by the U.S Army Military Personnel Center. The revised Chapter 51 provides a general description of the functional area, defines the areas of concentration, outlines the professional development objectives for officers in the grades of captain through colonel, and outlines the suggested criteria for the FA 51 single track career option.

Information Request Line

An FA 51 Information Request Line has been installed in the proponent office to facilitate the exchange of information between officers in the field and proponent office personnel. Officers desiring either individual or general information on FA 51 personnel issues are encouraged to use the 24-hour request line by calling either AUTOVON 284-8571 or commercial (202) 274-8571. A staff member of the FA 51 Proponent Office will acknowledge each request, and in some cases provide an initial response within one working day of receipt of the call. The office's goal is to submit a reply back to the individual within three working days.

Quarterly Newsletter

The FA 51 Proponent Office has established a quarterly newsletter that will be mailed to each officer in the FA 51 career field. Officers wishing to submit topics of interest should call the Information Request Line. The first issue is scheduled to be published by June 1, 1986.

FA 51 Officer Symposium.

Personnel proponent offices are charged with ensuring that viable career progression patterns exist in the career field for which they are responsible and with publicizing the career field opportunities available to junior officers interested in being professionally developed in the functional area. On February 25, 1986, BG Michael L. Ferguson, personnel proponent chairman for FA 51, conducted the first in a series of officer symposiums. Attendees were in the grades of captain through colonel representing the U.S. Army Training and Doctrine Command, the U.S. Army Materiel Command, the U.S. Army Strategic Defense Command and the Army Staff. The purpose of the symposium was to obtain the perception of officers in the field as to where the R&D Functional Area is today, and where it is going in the future. Officers were asked to provide recommendations on such issues as the single versus sequential tracking option for FA 51 officers, the development of a space-related career track, the expansion of civilian educational opportunities and subsequent utilization of the training, and the available career progression opportunities. Input received from the attendees will be presented to the FA 51 Personnel Proponent Committee for consideration. FA 51 officers will be kept informed of the results of the proponent office and proponent committee actions through articles in the FA 51 quarterly newsletter.

Army Occupational Survey Program

In coordination with the Soldier Support Center-National Capital Region, the FA 51 Proponent Office has developed an Army Occupational Survey Program (AOSP) relating to the research, development, test and evaluation arena. The AOSP, which is governed by AR 611-3, is a means of collecting and processing detailed military training and career field information. Information is collected by administering questionnaires to career field incumbents and supervisor or subject matter experts throughout the world. The questionnaires are computer processed and analyzed and the demographic data provided to the related personnel proponent office. The AOSP is designed to support and evaluate Army programs in the areas of classification, career field development and modification, quality training requirements, assignment policies and use of personnel, and personnel retention. The Soldier Support Center will mail the surveys to a random sampling of FA 51 officers during the third quarter of FY86. The survey is lengthy and will take time to complete. Officers selected to participate in the AOSP are asked to take the time and answer the questions. This is your chance to take part in the future professional development of personnel involved in the research, development, and test and evaluation cycle of the Army materiel acquisition process.

Additional information on the Functional Area 51 Proponent Office is available from Jo Laree Green, U.S. Army Materiel Command, ATTN: AMCDE-O, 5001 Eisenhower Ave., Alexandria, VA 22333-0001 or AUTOVON 284-8537/8538 or commercial telephone (202) 274-8537/8538.

NOTICE

A **REMINDER** to active officers in branches 51, 52 and 97, or with a 6T skill: Since we have switched to using your address as listed in your Officer Record Brief, it is important that you keep your records updated. A number of requests for change of address have been mailed to us, but we do not have the ability to make those changes. Your address comes to us in a computer printout from MILPERCEN, which is taken directly from your ORB. If you have changed your address recently, please change your ORB so the magazine can reach you at the proper address.

From The Field. . .

Test Kit for Defective Paints

The U.S. Army Construction Engineering Research Laboratory (CERL) has developed a new paint test kit which provides Army Directorate of Engineering and Housing (DEH) personnel with a quick, dependable and inexpensive way to determine the quality of paints and coatings.

One hundred paint test kits have been sent to installations worldwide under the Facilities Technology Application Test (FTAT) Program. FTAT is a five-year, $29 million program to demonstrate the effectiveness of new technologies in the areas of energy conservation, environmental quality, maintenance and repair of buildings, and maintenance and repair of pavements and railroads.

CERL's paint test kit consists of 14 simple tests that evaluate properties of paint, including adhesiveness, drying time, hiding power, and cleanability. The kit is intended to be a screening device used on site by DEH personnel. Screened paints which do not appear to meet Army standards can be sent to a laboratory for more detailed testing.

"Right now the only way the DEH can tell whether the paint will do the job is to send a sample to a laboratory for testing, or to rely on his or her judgement," said Ed Watling, chief of the Facilities Engineering Division in the Office of the Assistant Chief of Engineers. Field tests of the kit have resulted in positive reactions from DEH personnel.

"The directions are clear and the kit is easy to use," said James E. Hester, a construction inspector at the Fort Campbell, KY, Housing Management Division. "And using the paint test kit saved us the $200 we would have paid a laboratory."

DEH personnel will be asked to keep records on their use of it for one year. At the end of the year, they will be allowed eep the kit. Supplies for replenishing the kit can be purchased at local hardware stores. The paint test kits were manufactured for the Army by the Nucleus Corp. of Madison Heights, MI.

MTL Aids Army Mobility

To meet the needs of the Army's new light divisions, the Materials Technology Laboratory (MTL), Watertown, MA, is developing lightweight composite materials. These lighter materials have greater specific strength and stiffness, fatigue resistance, damage tolerance, corrosion resistance, and greater design flexibility than traditional materials.

MTL is quickening the pace of these efforts because advanced composite materials can reduce the amount of critical airlift resources needed to deploy light division assets rapidly. More firepower can be placed in a theater of operations for the same number of sorties. Hence, MTL's efforts can be a true force multiplier.

MTL also helped to demonstrate the ballistic soundness of the new vest and helmet now being issued to troops. The vest and helmet are made of aramid fiber first developed in the mid-1970s. MTL proved that both flexible and rigid forms of the fiber could survive stiff ballistic tests. The proof came in Grenada, where two soldiers of the 82nd Airborne Division took direct hits in the head while wearing the new helmet. Both kept right on fighting. A 7.62-caliber round still embedded in the fiber layers of one of the helmets is on display in a museum at Fort Bragg.

Successful VE Change Proposal

The Belvoir Research, Development and Engineering Center and Litton Guidance and Control of Woodland Hills, CA, recently signed a contract modification that resulted in a net unit savings of $12,550 for the Position and Azimuth Determining System (PADS). Estimated future savings for the Army could run as high as $3.6 million.

This savings is the result of a successful value engineering change proposal by Litton. Litton has a production contract with the center for PADS, which is an all weather, vehicle-mounted inertial surveying system that can provide continuous, three-dimensional position coordinates. It also stores its own software programs for operation and maintenance.

The company's proposal involved replacing the core memory design with a semiconductor memory. The present 32K core memory will be replaced with a 64K semiconductor memory that will provide increased reliability, greater availability of spare parts, and a lower life cycle cost. The Army adopted the change early last year and issued the contract modification last September.

The center's Value Engineering Program encourages contractors to submit cost savings proposals as a means of reducing the cost of Army materiel. The contractor then shares in the savings. Litton receives a 50 percent share of the net savings resulting from their proposal. This equals the Army's savings of $6,275 per unit. Additionally, future procurements for the PADS will entitle the company to receive a 50 percent share of the unit cost savings.

Awards. . .

Earlier this year, Deputy Secretary of Defense William H. Taft IV (left) presented the 1985 DOD Acquisition Streamlining Excellence Award to BG Ronald K. Andreson, LHX program manager. Presented at the Second National Conference on Acquisition Streamlining, Crystal City, VA, the award noted that under Andreson's leadership, the T-800 engine solicitation was developed based on a concise and simplified performance-oriented specification. This approach provided contractors the flexibility to fully incorporate streamlining concepts and offer the government price and performance guarantees.

AMC Names D'Amico Engineer of the Year

Dr. William P. D'Amico, a mechanical engineer at the Army Ballistic Research Laboratory (BRL), Aberdeen Proving Ground, MD, has been named Army Materiel Command (AMC) Engineer of the Year for 1986. He received the award earlier this year during a ceremony at AMC Headquarters.

D'Amico, who competed with engineers from throughout the command, has worked at BRL since 1968. His technical accomplishments in research and engineering span several areas, including flight dynamics, fluid mechanics, and hardware in-the-loop simulations. He is also credited with having a major impact in the design and development of the 155mm M687 chemical projectile and 155mm M825 improved smoke projectile system.

He recently developed, installed, and operated a three-degree-of freedom flight simulator for spin-stablized projectiles. This machine can reproduce the angular motion that a spin-stablized projectile would experience along its flight path. The system and supporting instrumentation and computer facilities provide a non-destructive platform for testing projectile components and subsystems. Currently, the flight simulator is involved in the brass board testing of ring laser and fiber optic gyroscopes that will be used as inertial sensors on smart munitions.

As AMC Engineer of the Year, D'Amico also competed with nominees from approximately 36 government agencies for the Federal Engineer of the Year Award, sponsored by the National Society of Professional Engineers. He was cited as an excellent example of the fine group of Department of the Army civilians who contribute so much to the accomplishment of the Army's many missions.

Dr. William P. D'Amico (right) receives congratulations and a plaque from AMC Assistant Deputy for Science and Technology Dr. Richard L. Haley in recognition of being named 1986 AMC Engineer of the Year.

Conferences & Symposia. . .

Training Systems Conference

The 8th Interservice/Industry Training Systems Conference will be held in Salt Lake City, UT, Nov. 18-20, 1986. Sponsored by the National Security Industrial Association in conjunction with an interservice team, the conference will be chaired by the Air Force and address the theme of Training Systems—The Next Step. The services' expanding emphasis from training equipment to the total training system will be highlighted.

Conference chairman Rodney S. Rougelot of Evans and Sutherland, Salt Lake City, notes that the conference will revolve around an exchange of information through the presentation of professional papers in three major categories: technical, management and user. Other features will include military and industrial guest speakers and an exhibits area.

Additional conference information may be obtained by calling the conference publicity office at the Naval Training Systems Center at (305) 646-4500.

Upcoming Conferences

- Twenty-third Association of Old Crows Electronic Warfare Technical Symposium and Convention, Sept. 28-Oct. 2, 1986, Atlanta, GA. POC: Jenny Clark (703) 920-1600.
- Tri-Service Combat Identification Systems Conference, June 10-12, 1986, Fort Monmouth, NJ. POC: Robert E. Torregrossa (201) 544-5111 or AV 996-5111.

Microwave and Millimeter Wave Conference

The 1985 Producibility of Microwave and Millimeter Wave Integrated Circuit Conference, held late last year at the U.S. Army Missile Command, Redstone Arsenal, AL, drew more than 150 attendees. The purpose was to highlight data gaps and opportunities in designing microwave and millimeter wave integrated circuits. Emphasis was placed on producibility, affordability, cost reductions and packaging density factors for small sensors. Papers from industry, the Army, Navy, Air Force and academia were presented during seven conference sessions.

Copies of the agenda and proceedings are available from Guidance and Control Information Analysis Center, Illinois Institute of Technology, 10 West 35th Street, Chicago, IL 60616 or telephone (312) 567-4519. Information on a tentative Nov. 4-5, 1986 conference is available from Joseph A. Derie II on AV 746-8421.

Personnel Actions. . .

Travesky Named NVEOC Director

P. D. Travesky

Paul D. Travesky has been appointed director of the U.S. Army Communications-Electronics Command's Night Vision and Electro-Optics Center, (NVEOC) Fort Belvoir, VA. He has previously served in a number of managerial positions at the NVEOC, including associate director of science and technology and director of the Advanced Concepts Division.

A recipient of the coveted Army Research and Development Achievement Award for exceptional technical accomplishment, Travesky holds a B.S degree in electronics engineering and a master's degree in engineering administration from George Washington University.

The Army's lead laboratory for night vision technology, the NVEOC employees more than 500 personnel, half of whom are engineers and scientists.

Reassignments and Promotions

LTG Robert L. Moore, Army Materiel Command (AMC) deputy commanding general for research, development and acquisition, is scheduled to retire on May 28, 1986.

LTG Lawrence F. Skibbie, AMC deputy commanding general for materiel readiness, will succeed LTG Robert L. Moore as deputy commanding general for research, development and acquisition.

MG Peter G. Burbules, commanding general, U.S. Army Missile Command, has been selected for promotion to lieutenant general and to succeed LTG Lawrence F. Skibbie as AMC deputy commanding general for materiel readiness.

MG James G. Boatner, AMC deputy chief of staff for personnel, is scheduled to retire in June 1986.

BG(P) Thomas D. Reese, assistant division commander, 5th Infantry Division, Fort Polk, LA, has been chosen to succeed MG Peter G. Burbules as commanding general, U.S. Army Missile Command.

BG(P) James R. Klugh, commanding general, Army Chemical RDE Center, and deputy commanding general, chemical materiel, Army Armament, Munitions and Chemical Command (AMCCOM), will replace MG James G. Boatner as AMC deputy chief of staff for personnel.

BG Peter D. Hidalgo, AMC deputy chief of staff for chemical and nuclear matters, will succeed BG(P) James R. Klugh as commanding general, Army Chemical RDE Center, and deputy commanding general, chemical materiel, AMCCOM.

BG Walter W. Kastenmayer, commanding general, 200th U.S. Army Materiel Management Center, Zweibrucken, Germany, will succeed BG Peter D. Hidalgo as AMC deputy chief of staff for chemical and nuclear matters.

Dr. James R. Houston has been named chief of the Coastal Engineering Research Center at the U.S. Army Engineer Waterways Experiment Station. He has also been selected for the Senior Executive Service.

Computer Age Turns 40

On Feb. 14, 1946, the world's first true computer was unveiled to the public by U.S. Army scientists and engineers at the Ballistic Research Laboratory (BRL). ENIAC, standing for Electronic Numerator, Integrator, Analyzer and Computer, was primitive by today's standards, but for the 1940s it represented a technological breakthrough that was to launch a multi-billion dollar industry.

ENIAC, or Project PX, its classified code name during World War II, was conceived in June 1943. The BRL was under terrific pressure to develop firing tables for Army artillery systems being developed to defeat the Axis. The BRL was capable of developing about 15 firing tables a week—but the weekly demand was closer to 40. The BRL's human mathematicians were facing a hopeless workload.

Without a firing table, which told the World War II artilleryman where to aim his cannon, the weapon was almost useless. Today, each artillery battery has its own computer system which accompanies it into the field and provides instantaneous firing and aiming data. Firing tables essentially are relegated to checking the accuracy of the computer-generated data.

In 1944, the need for firing tables had reached the critical point. The BRL, together with the Moore School of Engineering at the University of Pennsylvania in Philadelphia, launched an assault on the problem. Many of those working on the project had friends and relatives on the front lines, so they felt a personal urgency in their task.

The BRL and the Moore School had a broad concept of what was needed even before launching into the project. ENIAC was to be a decimal, not binary, machine capable of carrying out arithmetic operations in various separate units. Instead of having a separate general-purpose memory, ENIAC was to have the ability to store data in accumulators and a pair of external units consisting of a punch card reader and a trio of special-function tables that held mathematical constants in numbered switch banks.

Some of ENIAC's design was borrowed from earlier work done in the field of electronic computational devices, the most important of which was the concept of using vacuum tubes as switches. ENIAC's internal operations were synchronized by an electronic timer, the pulses from which kept the machine's varied functions operating in harmony.

ENIAC offered many advances over any previous attempt to create a computer: it had high speed, it had generality of purpose and it was programmable. Since no one knew how a digital machine should go about mathematically solving firing table problems, ENIAC was given the ability to solve almost any math problem, given a specified set of instructions.

When completed, ENIAC emerged as a program-controlled calculator, thousands of times faster and more capable than any previous design. Operating at 200,000 pulses per second, the ENIAC's accumulators were double the speed stipulated for the system and proved the practicality of the project.

ENIAC consisted of 40 panels containing 17,468 vacuum tubes, about 70,000 resistors, 10,000 capacitors, 1,500 relays and 6,000 manual switches. It was 8 feet high and 80 feet long, weighed 30 tons and consumed 174,000 watts of power.

By contrast, in 1982 a joint BRL-Magnavox project was successful in implementing an artillery solution (computing trajectories in real time) in a militarized-ruggedized device for artillery experiments on a howitzer test bed. This device, a FIST DMD (Fire Support Team Digital Message Device), represented early 1970 computer technology and was housed in a 20-pound box. This computer performed a more sophisticated and accurate computation than did ENIAC in 10 seconds or one-sixth of the projectile's flight. Currently, field artillery solutions can be done using specially-designed hand-held calculators weighing less than a pound. However, these calculators make use of simpler mathematical approximations than that used in the ENIAC-DMD comparison described above.

ENIAC, designed to help win World War II, wasn't operational until after the war had ended. Ironically, its first use had nothing to do with calculating firing tables. Its first task dealt with large, complex calculations that proved the feasibility of a proposed design for the hydrogen bomb. The program, run in November 1945, just months after the successful test of the atomic bomb, revealed a number of flaws in the proposed H-bomb design, flaws which would have been impossible to detect without the aid of ENIAC.

ENIAC, once in operation at Aberdeen Proving Ground, MD, in the BRL, served the defense effort until 1955 when it finally was turned off and replaced with a far more advanced computer.

Letters. . .

ILS: How to Do Versus What to Do

In reference to the article titled "Applying Sound Business Sense to Systems Acquisition" published in your July-August 1985 edition, I take exception to the allegation conveyed by the author's illustrations that our Integrated Logistic Support (ILS) requirements placed in solicitation documents and contracts are "how to do" as opposed to "what to do." Typically in the ILS area, there are requirements for the contractor to perform Logistic Support Analysis (LSA), to document LSA results in the LSA Record (LSAR), to generate the provisioning technical documentation, to develop the technical manuals and training materials, and to perform the "integrating actions" necessary to ensure that the logistic aspects of the system are considered in all system engineering and program management decisions.

Since ILS is not covered by a military standard, the requirement for the "integrating actions" must be written in as opposed to being imposed by reference. The statements of work I have reviewed which impose this work effort have all been "what to do" in nature. We have long realized the necessity for the contractor to perform this effort if the system is to be supportable when fielded. The debate as to whether such work statements are necessary to cause the contractor to do this integration was settled for me during the 1982 DARCOM ILS Study when we talked with several industry representatives and heard statements from them to the effect that such work statements were absolutely necessary if the Government expected the work to be performed.

With respect to LSA and LSAR, these efforts are covered by MIL-STD-1388-1A and MIL-STD-1388-2A, respectively. MIL-STD-1388-1A defines the fifteen LSA tasks and these task statements are written in "what to do" language allowing the contractor to specify the "how to" in the LSA plan provided either as part of the proposal or as a deliverable data item after contract award. Statements tailoring the LSA effort must be placed in the LSA statement of work and will add length to the solicitation document. The MIL-STD-1388-2A does specify data element definitions, data entry instructions, record formats, master file formats, and report formats. The degree of specification found in MIL-STD-1388-2A is required by the specific data interfaces that must be met when the contractor's logistic data is provided to the Government. A good example of this is the LSA-036 report which is produced from the LSAR data base and used to provide the Provisioning Parts List (PPL). The PPL is used to establish the Provisioning Master Record (PMR) within the Commodity Command Standard System (CCSS). Building the PMR requires that the PPL pass specific edits and that coding be exact. Cases like this where there are precise interface requirements with Government systems should never be considered as an area where the contractor is given the flexibility encouraged by the article. With all the constraints discussed previously regarding MIL-STD-1388-2A, the contractor still determines "how to" develop the required data elements.

Before we jump into this new approach and scrap our entire Department of Defense specifications and standards effort as the article implies, we need to take a good look at why this effort was started. While there are many reasons, I will discuss two that I consider important. First, specifications and standards preclude the contractor from giving us what he thought we wanted as opposed to what we actually wanted. Second, specifications and standards ensure that specific interfaces will be met. These interfaces may be with Government data systems, technical manual formats known and useable by our soldiers, critical safety requirements, human factor requirements, or the loading ramp of a transport aircraft.

In conclusion, our ILS and ILS-related specifications and standards have been designed and refined over a long period of time. They incorporate lessons learned and, for the most part, have had industry participation in their development. These specifications and standards allow us to have done what we want done and to get resultant products that are compatible with our standard systems.

I currently serve as the chairman of the Materiel Support Committee within the School of Acquisition Management at the U.S. Army Logistics Management Center, Fort Lee, VA. If questions should arise concerning this letter, I can be contacted at AUTOVON 687-2156/4250 or Commercial (804) 734-2156/4250.

David M. Morgan
Army Logistics Management Center

New Mailing System Works

About six years ago I wrote several letters and made numerous phone calls in an attempt to have my name placed on the list for RD&A. Only MILPERCEN answered my letters and they pleaded ignorance about any such list. After a while I gave up and just read the copy in the post library. If a copy was ever sent to my unit, it never made it to me.

Today I received my first direct mail copy of RD&A!!! Congratulations on your decision to change your mailing practices. Your new system really works! Thanks.

Albert B. Garcia
MAJ, Signal Corps

A Differing Opinion on NDI

Reference your January-February 1986 issue. The "rosy" picture presented in the article, "NDI at CECOM, The Acquisition Method of First Choice" is unfortunately typical of how "well" a need is being met by the acquisition community.

From a "users" view, it is nearly unbelievable that NDI could be touted as "the answer" considering the history of how well CECOM has executed NDI acquisitions. Examples of failures include the one used in the article; the AN/PRC-68 radio. What was not presented is that that procurement has been killed, since the PRC-68 radio could not meet the needs of the user. Actually, while the article leads you to believe the AN/PRC-68 was an NDI item, it was not. The authors are actually talking about the follow-on to the AN/PRC-68. Another example of extreme failure of CECOM NDI is the 1977 initiated procurement of the AN/TSC—a system still delayed for fielding to soldiers due to inadequate repair parts, manuals, reliability, and maintainability.

The follow-on box to the CECOM article indicated the British Howitzer, the L119, was an example of a good NDI procurement. That procurement is representative of what "gets lost" between conception of what is needed, and what is provided. In the "charter" for procurement of a howitzer, readers should note that the howitzer selected had to be capable of being supported (towed, crew transport, ammo, etc.) by the HMMWV. What is conspicuously absent in the article is the fact that the HMMWV can't transport ammo and can't tow the L119 nor carry its crew. Efforts are underway to clear the HMMWV for ammo handling and to also develop a heavier variant for use as a tow vehicle and other uses. However, it should be further noted that, at the time the howitzer charter was established, there was no plan to have the required 9,400 pound HMMWV variant.

Other articles concerning the time required to procure and field equipment have pointed out the difficulty in processing the requirement through the multi-levels of "indecision" layers before approval can be gained to procure. While NDI may be the way to go, unless the bureaucratic process is streamlined, we will continue to fail in our efforts to field systems in a timely manner. We have taken so long on NDI that we must now question whether we are buying (at today's prices) yesterday's technology. A prime example of this is TACCS.

The major point of this letter is to call out how poorly we hit our "going in" target and how rosy the view is from one prospective, but certainly not viewed the same by the ultimate customer (the soldier).

Gary E. Woodham
COL, U.S. Army

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THE SECRETARY OF DEFENSE

WASHINGTON, THE DISTRICT OF COLUMBIA

23 Dec 85

MEMORANDUM FOR ALL DEPARTMENT OF DEFENSE PERSONNEL

SUBJECT: Defense Hotline

A recent study by the U. S. Merit Systems Protection Board disclosed that Federal employees frequently do not report knowledge of fraud, waste, and mismanagement. This is, in part, due to fear of reprisals for such reports.

This Department continues to support the President's program to reduce fraud and waste in the Government and to improve management wherever possible. Since the inception of the Defense Hotline in 1979, we have received over 37,000 contacts. Of these, more than 10,000 substantive complaints have been referred for appropriate action. The program has documented savings of over $6.4 million.

The Defense Hotline is operated by the Defense Inspector General, who reviews all substantive issues and ensures appropriate criminal and administrative remedies are pursued. Protecting the confidentiality of Hotline users who prefer not to be identified remains a cornerstone of the program.

Taking or threatening reprisal against those who report irregularities will not be permitted. I fully endorse the Civil Service Reform Act of 1978, which provides protection against such reprisals. If you, as a DoD employee, believe that you are being punished for reporting irregularities, report it to the Special Counsel of the U. S. Merit Systems Protection Board. The numbers are: 800-872-9855 (toll free); 653-7188 (FTS); and (202) 653-7188 (commercial).

I ask each of you to continue to seek out and report needed improvements and suspected problems through established command channels or by calling or writing the Defense Hotline. Prudent management of our limited Defense resources requires constant vigilance and careful reporting of fraud, waste, or mismanagement.

The Hotline telephone numbers are: 800-424-9098 (toll free); 693-5080 (National Capital Region); and 223-5080 (Autovon). Mail can be addressed to the Defense Hotline, The Pentagon, Washington, D.C. 20301-1900.

Caspar W. Weinberger

DEPARTMENT OF THE ARMY

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